

AR54

Ballard Power Systems Inc.

1998

building customer relationships

annual report

**BALLARD®**

# building customer

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**Power to Change the World™** . . . More than a statement, this is our vision. Soon, Ballard® fuel cells will provide efficient, clean power where we need it most. Buses, automobiles, and trucks will provide the performance we expect without today's levels of pollution. Distributed power plants will provide high quality, reliable electricity without adding new high voltage transmission lines and central generating plants. Portable power systems will provide the flexibility we require without noisy generators or bulky batteries. This is the world powered by Ballard fuel cells.

## relationships

**building customer relationships**

Ballard is the world leader in the development and commercialization of proton exchange membrane fuel cells. Building on work begun in 1983, Ballard is now focused on transforming technology leadership into market leadership and setting the standard for those that follow.

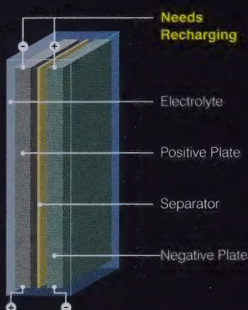
Through strategic alliances with global leaders in targeted markets, Ballard combines technology leadership in fuel cells and fuel cell systems with the product engineering, manufacturing, marketing, distribution and service capabilities of our strategic partners. This enables Ballard to advance deliberately and with reduced risk. Ballard is focused on building solid customer relationships and developing competitive products that will assist our customers in meeting their objectives.

Ballard is driven to meet goals and milestones. In each annual report, we look forward, setting objectives for the year ahead, and look back, reviewing the achievements of the past twelve months. This enables our shareholders to assess Ballard's progress each year and understand the Company's focus for the coming year.



## Rechargeable Battery

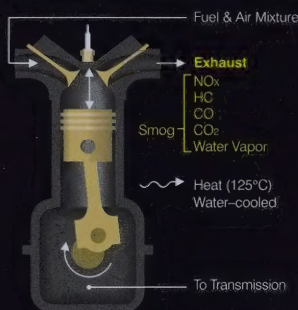
Low Temperature Electrochemical Process



Electric **Output** (40%-50% Efficiency)

## Internal Combustion Engine (ICE)

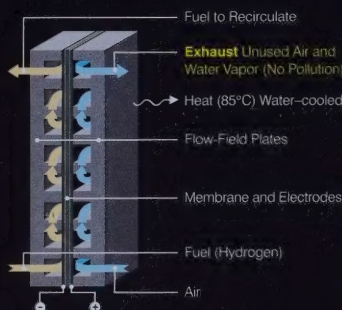
High Temperature Combustion Process (2500°C)



Mechanical Power **Output** (15%-20% Efficiency)

## Ballard® Fuel Cell

Low Temperature Electrochemical Process (85°C)



Electric **Output** (40%-50% Efficiency)

# fuel cells

the best alternative

Batteries are energy storage devices; they produce power intermittently. The recharging process is lengthy, inconvenient, and shifts pollution, efficiency and cost problems up the power line to central electric power plants.

The battery is recharged (refueled) and its electrodes are reconstituted by the time-consuming process of passing electricity into the battery. Batteries and fuel cells are both electrochemical (non-combustion) devices that have high efficiency and quiet operation, without the polluting by-products of combustion. A battery stores its energy in its electrodes. Electricity is released as the electrodes are consumed. In contrast, fuel cells produce electricity using fuel from an external tank. Fuel cells operate continuously as long as fuel is supplied and the tank can be quickly refueled, avoiding a time-consuming recharging process.

The high temperature combustion process in an ICE has low efficiency, produces harmful pollutants, noise, and vibration.

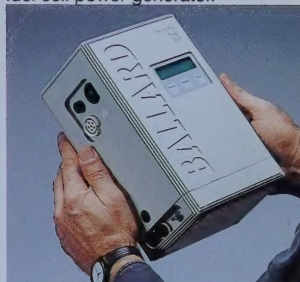
ICEs operate by burning fuel to create heat; the heat is converted into mechanical energy and then motive power or, by turning a generator, electric power. The efficiency of this conversion process is greatly affected by losses of waste heat and friction. In contrast, fuel cells efficiently convert fuel directly into electricity, making fuel cells more than twice as efficient as ICEs in extracting useful power from fuel. Like an ICE, fuel cells conveniently use fuel from a tank that can be quickly refueled and operate continuously as long as fuel is supplied. Unlike ICEs, however, fuel cells do not burn fuel and therefore do not produce the air pollutants resulting from combustion.

The Ballard fuel cell generates power in a fundamentally different way from the ICE and rechargeable batteries. Fuel cells have the advantages of both without the problems of either.

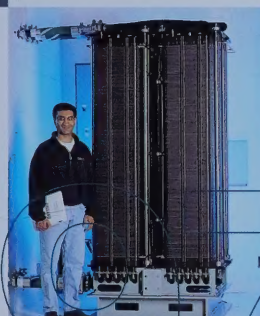
Fuel cells are electrochemical devices that are clean, quiet, and efficient; they operate continuously as long as fuel is supplied. Fuel cells have no moving parts; therefore, they have excellent reliability and long operating lives. Fuel cell systems can use multiple fuels such as natural gas, methanol, petroleum, and hydrogen. They have high power density sufficient to power an automobile and the refueling ease of an ICE. Fuel cell systems feature the positive qualities of both ICEs and batteries while overcoming the negative attributes of both. Fuel cells are the best alternative.



1997-The Necar 3 concept car, a Mercedes-Benz "A" class, powered by Ballard® fuel cells.



1996-Power density increased from 100 watts/litre in 1989 to over 1100 watts/litre in 1996.



1997-The 250 kilowatt Ballard fuel cell stack prior to installation in the power plant.

# 96&97 past achievements

## Product Development

## Transportation Engines

## Stationary Power Plants

## Other Applications

### 1996

- Implemented low-cost flow-field plates into production fuel cells.
- Implemented advanced low-cost catalyst technology in production fuel cells.
- Developed pilot manufacturing capability for polymer material for Ballard membrane.
- Developed advanced methanol fuel processor for marine applications.
- Obtained ISO 9002 certification.

- Secured contract to develop Ballard fuel cell engine operating on methanol for buses.
- Demonstrated passenger vehicle using advanced Ballard fuel cells with joint development partner Daimler-Benz (now DaimlerChrysler AG).
- Obtained order from BC Transit for fuel cell engines in bus demonstration fleet.
- Began building Ballard fuel cell engines for transit bus demonstration fleet.

- Secured energy marketing partner, GPU International, for the commercialization of stationary fuel cell power plants.
- Began building first prototype 250 kilowatt Ballard fuel cell power plant.
- Obtained commitment for \$30 million government funding for the development of stationary fuel cell power plants.

- Delivered fuel cell power plant modules to submarine manufacturer.
- Completed Ballard fuel cell methanol power plant for submarines.
- Secured new contracts for portable fuel cell power generator.

### 1997

- Demonstrated advanced low-cost materials in production fuel cells.
- Reduced the cost of production fuel cells (by over 50%) by implementing next generation components.
- Began implementation of pilot line for manufacturing fuel cells.
- Began qualification process for low-cost Ballard membrane in production fuel cells.

- Completed 3 fuel cell buses for Chicago Transit Authority and 3 fuel cell buses for BC Transit.
- Demonstrated methanol fuel cell car and hydrogen fuel cell bus with DaimlerChrysler.
- Secured partners, DaimlerChrysler and Ford Motor Company, for commercial development of fuel cells and systems for buses, cars, and trucks.
- Began development of next generation fuel cell transit bus engine.
- Obtained orders from Chrysler (now DaimlerChrysler), Ford and Nissan.

- Secured manufacturing partner, ALSTOM of Paris, France, for the commercialization of stationary fuel cell power plants.
- Completed fabrication and commissioned first prototype 250 kilowatt power plant.
- Secured orders for two field trial stationary power plants.

- Developed next generation low-cost portable fuel cell.
- Obtained order from Matsushita Electric Works for fuel cells for portable power generators.

Ballard's pilot production line for fuel cells was implemented during 1998.



Data collection from the prototype 250 kilowatt Ballard fuel cell power plant.



The October 1998 launch of BC Transit's fuel cell bus test fleet.



100 watt portable fuel cell power generator.

# 1998 achievements

## Product Development

- Completed implementation of pilot scale manufacturing processes for low-cost components.
- Completed design of commercial fuel cells to meet performance and cost requirements for automotive and portable applications. *Design for stationary applications is planned to be complete in 1999.*
- Secure relationships with suppliers of key fuel cell components: membrane, catalysts, and flow field plates. *Supplier relationship secured with catalyst supplier Johnson Matthey. Relationships with other suppliers are planned to occur during 1999 and 2000.*

## Transportation Engines

- Completed formation of new alliance integrating Ford into the existing relationship with Daimler-Benz (now DaimlerChrysler).
- Secure orders for next generation heavy-duty engine. *Expected to be completed during 1999. This does not delay the bus engine commercialization program.*
- Demonstrated next generation fuel cell automobile engine with partners.

## Stationary Power Plants

- Completed testing of prototype 250 kilowatt power plant.
- Completed design of next generation 250 kilowatt power plant for field trials.
- Secured orders and commenced building next generation 250 kilowatt power plants for field trials.
- Secured additional partner, EBARA Corporation of Japan, for Ballard Generation Systems.

## Other Applications

- Secure partners for commercializing portable fuel cell products. *Following extensive analysis of the business opportunities and markets for portable fuel cells, it was determined that having only one strategic partner for these markets is not in Ballard's best interest. Ballard is revising its strategy to allow better access to the diverse portable fuel cell markets.*
- Secure orders for fuel cells for portable power products.

- Objective achieved
- Objective partially achieved
- Objective not achieved



Testing of the prototype 250 kilowatt Ballard fuel cell power plant.

Ballard fuel cells are designed for specific applications, manufacturability and cost.



Ford's P2000 vehicle powered by Ballard fuel cells.



1 kilowatt portable fuel cell power generator.

# 1999 objectives

## Product Development

- ❑ Complete design of commercial fuel cells to meet projected performance and cost requirements for stationary applications.
- ❑ Secure relationships with suppliers of key fuel cell components: membrane and flow-field plates.
- ❑ Complete delivery of fuel cell stacks for Ballard Generation Systems' 250 kilowatt power plant field trial program.
- ❑ Develop and qualify high volume manufacturing processes for fuel cells and fuel cell stacks.
- ❑ Complete design of manufacturing process development plans for automobile fuel cell stacks to meet projected high volume cost targets.

## Transportation Engines

- ❑ Secure orders for next generation heavy-duty fuel cell engine for transit buses.
- ❑ Demonstrate next generation fuel cell automobile engine with partners.
- ❑ Secure orders for automotive fuel cells from automotive manufacturers.

## Stationary Power Plants

- ❑ Commence delivery of Ballard Generation Systems 250 kilowatt stationary power plants for the electric power generation field trial program.
- ❑ Develop processes for 250 kilowatt power plant pilot scale assembly line.
- ❑ Complete market research and initial product definition for small stationary power plants.

## Other Applications

- ❑ Secure orders for fuel cells for portable power products and portable fuel cell demonstration systems for market evaluation.
- ❑ Complete strategic market evaluation and define a portable market entry product.



Building on our strong technology foundation during 1998, we continued the evolution to the next stage of the Company's development, focusing on product design, high volume, low-cost manufacturing processes, and building customer relationships.

Left to right  
Dr. Alfred E. Steck  
Firoz Rasul  
Neil Otto  
Layle K. (Kip) Smith  
Scott A. Weiner  
Paul Lancaster  
Noordin S. K. Nanji  
Michael Graydon



I am pleased to report that 1998 was a successful year for Ballard. We completed three major strategic partnerships, added strength to our management team, built a strong cash position to develop our products for commercialization, and initiated fuel cell bus field trial programs. We implemented a pilot production line, and positioned the Company to transform Ballard's technology leadership position into market leadership.

A key to our success is the passion and commitment of our employees. This has powered the Company to become the leader in proton exchange membrane (PEM) fuel cells. Building on our strong technology foundation during 1998, we continued the evolution to the next stage of the Company's development, focusing on product design, high volume, low-cost manufacturing processes, and building customer relationships.

To assist you in assessing our progress during 1998, this annual report outlines our principal objectives and performance for the past 12 months and presents our goals for 1999 on pages 4 and 5. We are pleased to report that in 1998 we fully achieved 8 of our 12 objectives, and partially achieved two objectives that will be completed in 1999. We did not achieve two planned 1998 objectives. The first was to secure additional orders for heavy-duty bus engines, which we are on track to achieve in 1999. This delay in obtaining additional orders for bus engines will not affect our goal of introducing commercial

heavy-duty bus engines during 2002. The second goal we did not achieve in 1998 was the securing of a partner for the portable market. We are revising our business strategy for this market following an analysis of the business opportunities and diverse markets for portable fuel cells. Based on our analysis, we have determined that supplying fuel cells to several original equipment manufacturers in the diverse portable market segments will allow better access and offer more opportunities to Ballard.

In 1998, market demand continued to grow for a reliable source of power that is efficient, clean, quiet, vibration-free, and easily sited in a wide variety of applications. In all markets, conventional power generation is faced with tightening regulations aimed at reducing pollution from burning fossil fuels and growing international concerns about global warming. This growing demand has served to further Ballard's growth and promote the development of the fuel cell industry. In stationary electric power generation applications, fuel cells offer possibilities for providing power that is clean, dependable, high quality, cost effective, and easily sitable. In transportation applications, fuel cell powered engines promise to provide equal or better performance and better fuel economy than a traditional internal combustion engine, while providing zero or trace air emissions and offering the potential for lower capital and maintenance costs.





For portable power applications, Ballard® fuel cells offer compact size, low noise, and high fuel efficiency.

These factors drive the continually increasing interest in fuel cells by vehicle manufacturers, energy companies, commercial and industrial power users, environmentalists, regulators, the media and the public. The commercial potential of fuel cells has attracted serious commitment from a number of new corporate entrants seeking to participate in one or more fuel cell markets, creating a truly viable fuel cell industry within which Ballard aims to continue to lead and expand its business. Ballard's technology lead was confirmed in 1998 by an independent report prepared for the California Air Resources Board that assessed worldwide fuel cell developers working on fuel cells for transportation.

Customer relationships will continue to be a cornerstone of Ballard's success as we advance in the commercialization of our products. Our ability to design and deliver products that fully satisfy our customers' requirements will be the basis of our market success. Therefore, we are building and strengthening relationships with the organizations that will be Ballard's customers – those who want to gain competitive advantage by designing the Ballard fuel cell into their products. These customer relationships form the foundation for commercial fuel cell supply agreements, provide valuable information on the requirements of our various

markets and secure market access to end users of Ballard fuel cells.

Having demonstrated the performance of Ballard fuel cells in our target applications, our priorities in product development are to continue to reduce costs and improve manufacturability. To achieve this goal, during 1998 we made significant progress in simplifying the design of components, identifying alternative lower-cost materials, entering into long term supply relationships, and developing high volume manufacturing processes, all with the assistance of our strategic partners, DaimlerChrysler and Ford Motor Company. Recognizing that an important part of Ballard's commercial success is the development of the methodology and tight controls necessary for successful manufacturing enterprises, we earned ISO 9001:1994 certification for Ballard's Quality System. This certification demonstrates that Ballard is equipped for and committed to the discipline of quality in the design, development, production, supply and servicing of Ballard fuel cells.

One of the most important events of 1998 was the addition of Ford Motor Company to the Ballard/DaimlerChrysler alliance. The alliance now has three companies that together can offer the world's car, bus, and truck manufacturers complete fuel cell power trains and components. *dbb fuel cell engines* (*dbb*), one of the alliance companies, is responsible for developing and





manufacturing the fuel cell systems incorporating the Ballard fuel cell stacks. Ecostar Electric Drive Systems (Ecostar) provides electric drive trains that convert the fuel cell system electric power into motion at the vehicle wheels. Ballard Automotive is the marketing channel for Ballard, *dbb* and Ecostar to serve the automotive manufacturers. Ballard Automotive offers products from a complete fuel cell power train to subsystems to individual components, allowing manufacturers to develop their own fuel cell powered vehicles. Ballard supplies all fuel cell stacks to the alliance and owns a minority interest in *dbb*, Ecostar and Ballard Automotive. The structure of the Ballard/DaimlerChrysler/Ford alliance allows us to focus on commercializing Ballard fuel cells, and at the same time enabling Ballard to capture value for our shareholders by benefiting from other products for fuel cell powered vehicles.

During 1998 we supplied Ballard fuel cells to customers, secured additional orders, and worked closely with our alliance partners *dbb* and Ecostar in the development of fuel cell engines and electric drive trains for cars, buses, and trucks. For auto manufacturers, Ballard, *dbb* and Ecostar offer a rapid and cost effective way of accelerating fuel cell vehicle development using the alliance's leading edge fuel cell technology. In fact, seven of the world's ten largest auto manufacturers have publicly stated their

intention to offer fuel cell powered cars around 2004. While five of these seven auto manufacturers are Ballard customers, we are committed to adding other auto companies to our customer base.

In late 1998, auto manufacturers unveiled several fuel cell concept cars. In September at the Paris Motor Show, GM showed their first fuel cell powered vehicle based on the Opel Zafira minivan. Nissan also unveiled a prototype fuel cell powered vehicle in Japan during September. In December at the Los Angeles Auto Show, DaimlerChrysler showed the Jeep Commander and in January 1999 at the Detroit Auto Show, Ford showed their P2000 fuel cell vehicle. These vehicles will be joined by a number of concept cars during 1999, many of which will be powered by the Ballard fuel cell.

During 1998, we also began to see visible interest by fuel providers in the development of the fuel infrastructure for fuel cell powered vehicles. Shell International and *dbb* began cooperating on fuel processing technology for multiple fuels, while Mobil Oil and Ford commenced joint development on fuel and fuel processors. As well, Exxon and ARCO continued their fuel processing development programs. In addition to technology development, we also saw increased acceptance by traditional oil companies to distribute an alternative fuel to petroleum.

As part of the development of heavy-duty fuel cell engines for transit buses, Ballard and *dbb* began two-year fuel cell





bus testing and demonstration programs with the Chicago Transit Authority and British Columbia Transit during 1998. The field test programs have allowed us to operate the prototype fuel cell engines in normal service and identify component and system modifications to improve performance and reliability. Periodically, Ballard and *dbb* take the buses out of service to perform additional tests and incorporate modifications. The programs have provided Ballard and *dbb* with invaluable feedback from the bus riding public, drivers, mechanics and the two transit authorities. The data and learning derived from the two programs is being incorporated into the development program currently underway for our next generation fuel cell bus engine.

The overall response to the ongoing field test programs of the world's first fuel cell powered transit buses operating in regular, revenue service has been positive. Ballard, *dbb*, and the two transit authorities are pleased with the progress to date. The results give us the confidence that we are on track to achieve our commercial bus engine product introduction in 2002.

In stationary electric power generation, our subsidiary Ballard Generation Systems (BGS) completed agreements for collaborating with both ALSTOM SA of France and EBARA Corporation of Japan to commercialize Ballard fuel cell stationary power plants. In addition to ALSTOM and EBARA's equity investments in BGS, two new companies were formed,

both 49% owned by BGS. In Europe ALSTOM BALLARD will market, distribute and later manufacture power plants. EBARA BALLARD will do the same in Japan.

Building on the ALSTOM and EBARA collaborations, BGS received seven additional orders for field trial units of the Ballard fuel cell powered 250 kilowatt power generation plant. BGS continued testing that began in August 1997 of the first prototype 250 kilowatt fuel cell power plant and is incorporating the experience into the design of the 250 kilowatt field trial units. Construction of the first field trial units has commenced to meet scheduled deliveries that begin in the fall of 1999. The field trial programs will provide an opportunity for BGS to test its prototype 250 kilowatt power plants in customer settings. This program will provide invaluable information from users on performance, operation and maintenance requirements for incorporation into the development of a commercial version of the product.

The characteristics of Ballard fuel cells offer the opportunity to develop a product for numerous applications that need power. We therefore began to evaluate early market opportunities for portable fuel cell generators in products under 10 kilowatts in size. This market is diverse in product applications, geographic distribution, and manufacturers. During 1998 we developed a one kilowatt fuel cell generator for market research





purposes and delivered units to Honda and Matsushita Electric Works for testing for portable applications. During 1999 we intend to define the first products for the portable market and secure orders from original equipment manufacturers.

From a financial standpoint we closed the year in a strong position. Shareholder's equity at year-end was \$656 million, which included \$441.3 million in cash and short-term investments, and no debt. The cash will enable us to continue our commercial product development and provide the financial strength to continue meeting our commercialization goals.

Ballard's corporate style, a blend of entrepreneurial and technological creativity with comprehensive business planning and conservative financial management, has served us well over the years. Recognizing the new challenges facing Ballard as it approached commercial launch of its products, the Board of Directors determined in late 1997 that different skills and experience would be necessary to lead the Company in its next phase of evolution, both on the Board of Directors and in management. As a result, after 10 years of service Michael Brown and Anthony Charnish elected to retire from the Board of Directors, and Stephen Bellringer, Raymond Royer, Douglas Whitehead and from Ford, Dr. John McTague joined as new members. Dr. McTague retired from Ford and the Board at the end of 1998 and has been replaced on the Board of Directors by Neil Ressler, also from Ford. We would like

to thank Michael Brown, Anthony Charnish and John McTague for their dedication and service to Ballard.

Mossadiq Umedaly, Ballard's former Chief Financial Officer also chose to leave Ballard in 1998 and we would like to thank Mossadiq for his eight years of commitment and contribution to the Company.

In addition to changes in the Company's Board of Directors, the management team was strengthened as we recruited individuals with the skills and experience required to guide Ballard through its evolution to a manufacturing and commercial organization. Layle K. (Kip) Smith, joined us as Chief Operating Officer, coming from The Dow Chemical Company and bringing extensive experience in operations and strategic planning. Michael Graydon joined us as Chief Financial Officer, coming from Toyota Motor Manufacturing Canada and bringing extensive knowledge in developing the business systems and processes for "best in class" manufacturing. Paul Lancaster was appointed Vice President, Corporate Development after 8 years with Ballard where he was actively involved in forming our major strategic relationships. Noordin S. K. Nanji joined us as Vice President and General Counsel, coming from Lang Michener Lawrence and Shaw where he was a partner and since 1993 an integral part of the Ballard team that structured and negotiated our strategic relationships. With the addition of these new members, the experience





and capabilities of our management team will allow us to meet the challenges ahead and continue to maintain and expand Ballard's leadership position.

We are also proud to note the recognition bestowed by Time Magazine in early 1999 on Ballard's former Chairman and one of its founders, Dr. Geoffrey Ballard. He was named a "Hero of the Planet" for his involvement with Ballard Power Systems.

1998 marked another successful year for Ballard. We developed new customer relationships that are the seeds of our future commercial success. We advanced our technology and enhanced our leadership position. We focused on our commercialization goals and are on track to achieve our market entry dates. Through the commitment of our people, the support of our shareholders and our dedication to our corporate vision, "Power to Change the World™", we are well positioned to continue to meet our goals and to realize the commercial potential offered by the Ballard fuel cell.

On behalf of the Board of Directors

A handwritten signature in black ink, appearing to read "Firoz Rasul", with a stylized, flowing script.

**Firoz Rasul**

*President and Chief Executive Officer*

March 19, 1999

This letter contains forward-looking statements reflecting Ballard Power Systems Inc.'s current expectations as contemplated under the Safe Harbor provisions of the US Private Securities Litigation Reform Law of 1995. Investors are cautioned that all forward-looking statements involve risks and uncertainties, including, without limitation, product development delays, changing environmental regulations, the ability to attract and retain business partners, future levels of government funding, competition from other fuel cell manufacturers, competition from other advanced power technologies, competition from existing power technologies, evolving markets for generating electricity and power for transportation vehicles, the ability to provide the capital required for product development, operations and marketing, and year 2000 readiness. These factors should be considered carefully and readers should not place undue reliance on Ballard's forward-looking statements. Investors are encouraged to review the section Management's Discussion and Analysis titled "Operating Results, Capital Requirements and Risks" (pages 30 to 34) for a more complete discussion of factors that could affect Ballard's future performance.



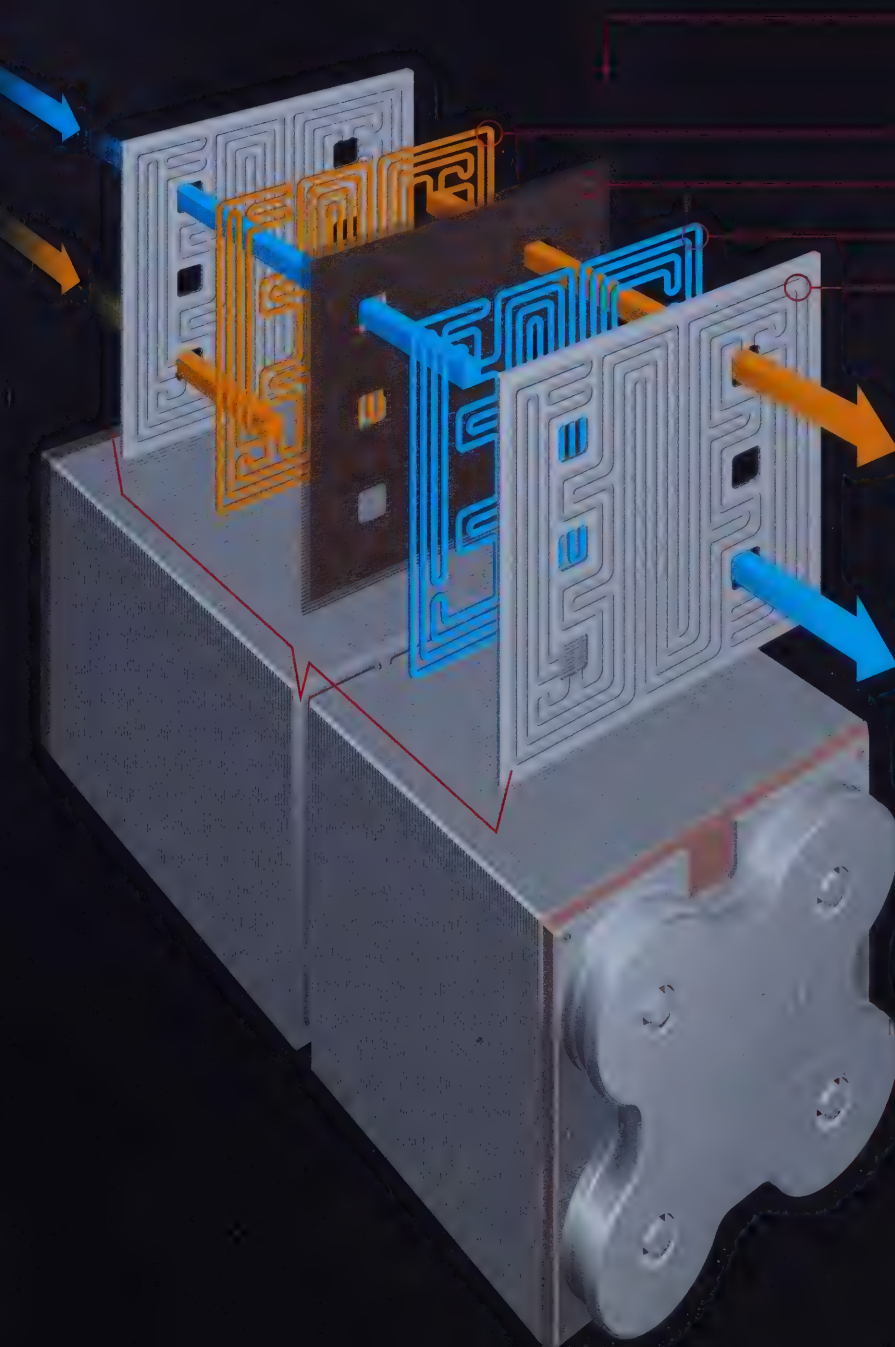


## How the Ballard® Fuel Cell Works

The core of the Ballard fuel cell consists of two electrodes, the anode and the cathode, separated by a solid polymer membrane electrolyte. Each of the electrodes is coated on one side with a thin platinum catalyst layer. Hydrogen fuel dissociates into free electrons and protons (positive hydrogen

ions) in the presence of the platinum catalyst at the anode. The free electrons are conducted in the form of usable electric current through the external circuit. The protons migrate through the membrane electrolyte to the cathode. At the cathode, oxygen from air, electrons from the external circuit and protons

combine to form pure water and heat. To obtain the desired amount of electrical power, individual fuel cells are combined into a fuel cell stack. Increasing the number of cells in a stack increases the voltage while increasing the surface area of the cells increases the current.



### Expanded Single Fuel Cell

A single fuel cell consists of the membrane electrode assembly and two flow-field plates.

### Hydrogen

Hydrogen flows through channels in flow-field plates to the anode where the platinum catalyst promotes its separation into protons and electrons. Hydrogen may be supplied to a fuel cell directly or can be obtained from natural gas, methanol, or petroleum using a fuel processor.

### Membrane Electrode Assembly

Each membrane electrode assembly consists of electrodes (anode and cathode) with a thin layer of catalyst, bonded to either side of a proton exchange membrane (PEM).

### Air

Air flows through the channels in flow-field plates to the cathode. Oxygen in the air attracts the hydrogen protons through the PEM. The air stream also removes the water created as a by-product of the electrochemical process.

### Flow-Field Plate

Gases (hydrogen and air) are supplied to the electrodes through channels formed in flow-field plates.

### Complete Fuel Cell Stack

Single cells are combined into a fuel cell stack to produce the desired level of electrical power.

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### **Building the Business – Transforming Technology Leadership into Market Leadership**

Ballard Power Systems Inc. is the acknowledged world leader in the proton exchange membrane (PEM) fuel cell industry. This was confirmed in 1998 by an independent study commissioned for the California Air Resources Board that evaluated the activities and relative position of all transportation PEM fuel cell developers worldwide. Ballard's leadership position is the result of innovation in product development, a resolute market focus, strong strategic partnerships with industry leaders, employee commitment, and financial conservatism. By following its strategic plan, Ballard and its partners intend to bring the first and best PEM fuel cell products to market, and by doing so, seek to create the industry standard.

Ballard is currently focused on developing fuel cell products for two initial business areas, propulsion power for transportation applications and stationary electric power generation. A third business, portable generators, is being evaluated during 1999 to determine market entry products.

To transform the Company's technological leadership into market leadership, Ballard has established strategic partnerships with DaimlerChrysler AG (DaimlerChrysler) and Ford Motor Company (Ford) for transportation applications, and GPU International Inc., ALSTOM SA, and EBARA Corporation for stationary electric power generation applications. These partnerships combine Ballard's strength in PEM fuel cells with its partners' extensive industry experience, systems and manufacturing expertise, financial resources, and the corporate commitment to bring fuel cell products to market.

### **Product Development – Maintaining Focus**

In 1998, the development of a fuel cell industry continued as additional companies recognized the potential for fuel cell products and began to examine how fuel cells will impact their core business. 1998 also saw the entry of a number of new PEM fuel cell developers. Ballard welcomes these developments as they serve to broaden the market acceptance of fuel cells and fuel cell powered products. Ballard is dedicated to maintaining its leadership position by building on its strong foundation, maintaining its technology lead, focusing on cost reduction and manufacturing processes, and creating customer relationships for first-to-market products.

Increasing competitive activity makes Ballard's intellectual property, including patents and know-how, an even more precious asset. By the end of 1998, Ballard had 280 worldwide patents issued, allowed or pending, covering 90 distinct inventions. This compares with 220 patents issued, allowed or pending for 70 distinct inventions at the end of 1997.

### **Meeting Market Requirements**

Ballard's target markets have different operating environments and each imposes unique requirements on the power source used. As a result, the specifications for fuel cells are different for each market. Transportation applications require a compact, powerful engine with an operating life between 5,000 to 20,000 hours, that costs in the range of US\$50 to \$200 per kilowatt. Stationary electric

power generation applications require high fuel efficiency, long operating life of up to 40,000 hours, and costs in the range of US\$1,000 to \$2,000 per kilowatt. The portable power market presents additional opportunities for Ballard, however it is segmented with a variety of operating characteristics.

For each application, Ballard's product development process includes the use of field trials at an early stage to test and evaluate components and product designs to identify possible product improvements. Field trials also provide timely feedback from users which is necessary for successful market introduction of Ballard® fuel cell powered products.

To be cost-competitive with conventional technologies, Ballard and its partners have set aggressive cost reduction targets. Paths to achieve these targets include using low-cost materials, improving designs to increase performance and simplify manufacturing, and developing manufacturing processes for high volumes. This effort is accelerated through concurrent engineering between product development and manufacturing groups to reduce the time required for qualifying and incorporating engineering advances into manufactured products. Focused on cost reduction and product performance, Ballard is driving to achieve its goal of being first to market.

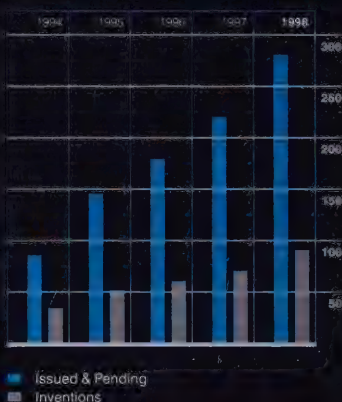


building customer relationships

future

development

## Patents



"Intellectual property, including patents and know-how, is a precious Ballard asset. By the end of 1998, Ballard had 280 worldwide patents issued, allowed or pending, covering 90 distinct inventions."



## Ballard Product Development



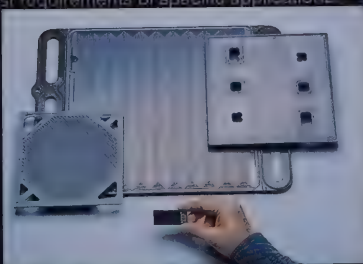
Fuel cell test stations operate 24 hours a day to evaluate lifetime, alternative materials and new designs.



Development of Ballard's proprietary proton exchange membrane.



Pilot production line for fuel cells was implemented during 1998.



Low cost flow-field plates are being developed to meet the cost requirements of specific applications.

Light-Duty Transportation

Transportation in Harmony with the Environment

During the 1990s, increasing concerns about the effects of air pollution on human health and quality of life led to public policy initiatives which tightened air quality standards and promoted the development of clean energy technologies. These air quality concerns and standards have put pressure on auto companies to seek cleaner alternatives to the internal combustion engine, which has been the standard of transportation power for the last 100 years. This has resulted in the current focus on PEM fuel cells by the automobile industry as the most likely clean power source to replace the internal combustion engine.

Originally, auto companies looked for an alternative to the internal combustion engine due to environmental considerations. Today, auto companies are beginning to recognize that PEM fuel cells offer additional benefits and opportunities to deliver a product that cannot only match, but exceed, the benefits today's consumers currently receive in an internal combustion powered vehicle. These added benefits include higher fuel efficiency, low noise and vibration, enhanced passenger comfort and performance, lower maintenance costs, auxiliary power, and new vehicle design options.

Continuing Regulatory Pressure

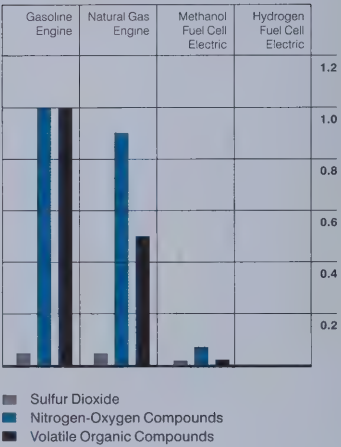
Despite the global move toward cleaner sources of power for transportation applications, the pressure from environmental regulators for cleaner vehicles continues. Although regulatory initiatives have had a significant environmental benefit, steady increases in motor vehicle population, miles driven, and fuel consumption have reinforced the pressure for further reductions in vehicle emissions. At the end

of 1997, more than 107 million people in the United States—about 40 percent of the population—lived in areas that did not meet U.S. standards for one or more key air pollutants. According to the U.S. Environmental Protection Agency (EPA), transportation generates 49% of smog-causing pollutants, 77% of carbon monoxide (CO), and about one-third of the carbon dioxide (CO<sub>2</sub>) emissions in the United States.

California, home to 10 percent of the vehicles in the United States, was one of the first states to recognize that significant reductions in vehicle emissions would be needed to achieve U.S. federally mandated air quality goals. Under California's low emission vehicle program, adopted in 1990 and reaffirmed in 1996, 10 percent of the cars sold in the state by 2003 must be zero-emission vehicles (ZEVs). Additionally in 1998, California issued rules for 2004 to 2010, which tighten allowable emissions for cars, and require vans, pickup trucks and sport utility vehicles to comply with passenger car emission levels by 2007. It is expected that California's regulations will continue to be periodically reviewed to ensure that they reflect the progress in the development of technologies that can both meet the regulations and market expectations. California's clean air initiatives have influenced other states, including New York and Massachusetts, which adopted the same rules and time-tables. Additionally, 22 other states and the District of Columbia reached an agreement with major auto companies to adopt voluntary low emission vehicle standards that are significantly more stringent than current U.S. federal regulations, which the EPA has ruled will apply nationally in 2001.

In addition to the environmental pressures within the United States, the December 1997 ratification of the Kyoto Protocol by 177 countries,

Total Relative Emissions from Vehicles



and the subsequent implementation discussions in Buenos Aires during 1998, continue to highlight the worldwide push for the reduction of global warming greenhouse gases such as CO<sub>2</sub>. The Kyoto treaty mandates the reduction of CO<sub>2</sub> by industrial countries to approximately 5% below 1990 levels by 2012.

Together these trends towards more strict environmental policies maintain pressure on auto companies to produce vehicles that are not only practical and affordable, but are also environmentally benign.

Fuel Cells are the Preferred Choice

Auto companies are responding to these pressures by testing and developing vehicles using alternative clean air technologies, including battery-powered electric vehicles, internal combustion-electric hybrids and fuel cell powered vehicles. The challenge for battery-powered vehicles is to deliver the required power and driving range between charges, while keeping size, weight, charging time and cost within practical limits. Internal combustion-electric hybrids, which draw power at times from an internal combustion engine and at times from a battery, are complex systems for which performance, reliability, emissions, and cost remain significant challenges. Hybrids are also designed for a specific narrow duty cycle or

building customer relationships

transportation



"Fuel cells offer real promise to provide low or zero-emission vehicles with competitive performance and driving range. Working with Ballard and DaimlerChrysler, we will lead the introduction of clean fuel cell powered vehicles."

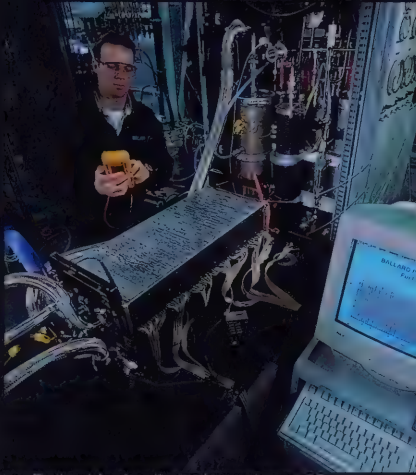
**Neil W. Ressler**

*Vice President and Chief Technical Officer*  
Research and Vehicle Technology  
Ford Motor Company

"In our working lifetime we will be a fuel-cell-driven enterprise. I'd like us to be the cleanest automobile company in the world."

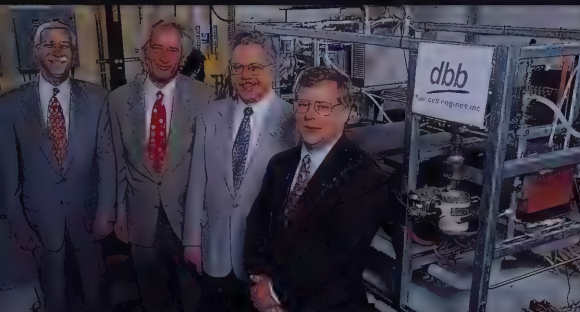
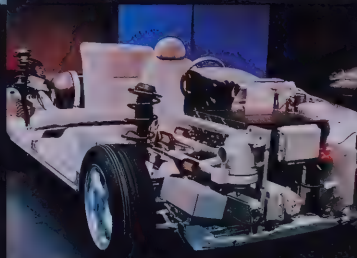
**William Clay Ford Jr.**

*Chairman*  
Ford Motor Company



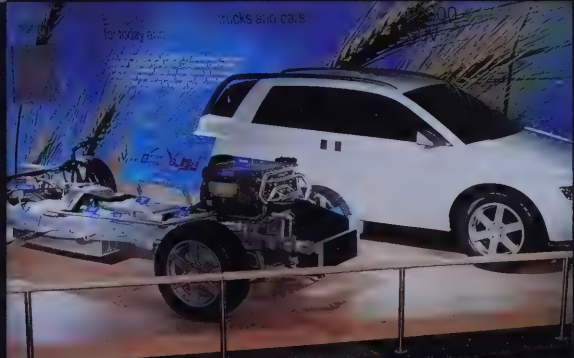
An automotive Ballard fuel cell stack produces 25 kilowatts of power.

Ballard's first automotive fuel cell was displayed at the 1996 Auto Show.



Acceptance testing the first fuel cell system produced by the Ballard/DaimlerChrysler/Ford alliance before delivery to Ford for the P2000 vehicle.

Left to right  
 Fritz Rausel, Ballard Power Systems  
 Dr. Ferdinand Panik, dbb fuel cell engines  
 Brad Bates, Ford Motor Company  
 Neil Otto, Ballard Automotive



Ford's P2000 SUV using Ballard's fuel cell engine.

driving profile. Fuel cell powered vehicles promise to meet the performance, comfort, convenience, reliability, and safety standards of general-purpose conventional vehicles with trace or no emissions.

During 1998, Ballard® fuel cells were demonstrated and tested in several prototype vehicles. Seven of the world's ten leading auto companies announced their goals of introducing production fuel cell vehicles in the 2003 to 2005 timeframe. Of these seven, five are either partners or major customers of Ballard.

### Cost Reduction and Manufacturing

Ballard's work on transportation fuel cells has focused on increased performance to meet automotive power requirements. Ballard has consistently increased fuel cell electrical power output while reducing weight and size (i.e. higher power density). Through increased power density, Ballard has created fuel cell designs that fit within the tight space constraints of a vehicle while delivering the needed power. Ballard continues to extract more power out of smaller and lighter fuel cells while reducing costs on its path to make fuel cell engines competitive with internal combustion engines. Today, prototype transit bus engines powered by Ballard fuel cells fit into the space normally used by diesel bus engines. Additionally, DaimlerChrysler's Nectar 4 and Ford's P2000 fuel cell prototype vehicles are powered by Ballard fuel cells with a power density over 10 times that of Ballard's 1990 fuel cells.

During 1998 the Company's development activities for transportation applications focused on achieving continued reduction in fuel cell costs. The required cost reductions are being achieved by concentrating efforts in four main areas. First is the selection of low cost materials without compromising existing fuel cell performance. Second is ensuring that selected materials are consistent with the use of low cost, high volume manufacturing processes. Third is developing product designs that have inherent high yield and low scrap rates combined with eliminating components and parts. Finally, Ballard is forming supplier relationships that will allow the manufacture of fuel cells in volumes that will result in sufficient economies of scale to drive the final costs down. Ballard made significant progress in all of these areas in 1998.

### Alliance for Fuel Cell Vehicles

Ballard began its history of strategic partnerships in 1993 through a four-year collaboration agreement with Daimler-Benz AG (now DaimlerChrysler AG) that was focused on joint development of a compact, high power density fuel cell and appropriate processes for component manufacturing. The Ballard fuel cells used to power three generations of DaimlerChrysler car prototypes and a bus prototype were products of the collaboration. In 1997, the companies extended and greatly expanded their relationship through a \$450 million alliance that included DaimlerChrysler taking an initial 25% equity position in Ballard. The alliance also saw the formation of a jointly held company, *dbb fuel cell engines GmbH (dbb)*. This company is responsible for developing the components and

integrating them with a Ballard fuel cell to create a fuel cell engine for a car, bus or truck.

During 1998, Ford joined Ballard and DaimlerChrysler, further expanding the partnership through a \$600 million investment that included Ford taking a 15% equity position in Ballard and investing \$100 million in *dbb*. DaimlerChrysler's equity position in Ballard was reduced to 20% as a result of Ford joining the alliance. The addition of Ford to the alliance also included the formation of Ecostar Electric Drive Systems (Ecostar), a venture that is based upon Ford's leadership in advanced electric vehicle drive systems technology and is responsible for creating the electric drives powered by the fuel cell engines.

Under the alliance agreements, Ballard manufactures and supplies Ballard fuel cells to the alliance company *dbb* and vehicle manufacturers who choose to develop their own fuel cell engines. DaimlerChrysler and Ford will purchase their fuel cell engines from *dbb* and their fuel cells from Ballard.

To simplify the market channel to auto companies for Ballard, *dbb* and Ecostar products, Ballard Automotive Inc., a sales company, was formed. Through Ballard Automotive, auto companies can purchase a complete fuel cell drive train, complete subsystems or individual components needed to create their own fuel cell powered drive trains.



# light-duty transportation

building customer relationships

## Market Applications



DaimlerChrysler's new PT Cruiser SUV was unveiled at the Los Angeles Auto Show in December 1998.



Hyundai's new Sonata is shown in a showroom.

"We are investing in fuel cells because we are committed to sustainable mobility and because we believe this investment will pay off. Fuel cells have the potential to be the most attractive alternative propulsion system for the long term."

**Jürgen Schrempp**

*Chairman*

DaimlerChrysler



DaimlerChrysler Jeep Grand Cherokee  
with Ballard fuel cell system  
operating on a city driving cycle  
with 100% hydrogen fuel



Testing a Ballard fuel cell under  
driving cycle



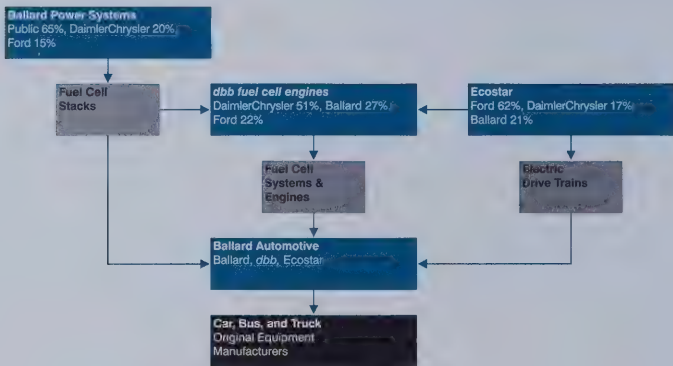
Refueling of Ballard fuel cell vehicle

The evolution of Ballard's transportation fuel cells -- from  
100 watts/litre in 1989 to over 1100 watts/litre in 1996.





Commercialization Strategy – Transportation Engines



Together, the alliance is focused on achieving the principal objective of developing the next generation propulsion technology based on the Ballard fuel cell. This includes further development of fuel processing technology that allows the use of hydrocarbon fuels, and the development of the electric drive systems that are powered by the fuel cell engine to propel the vehicle. Today, Ballard fuel cells are being designed for use in electric vehicles that will operate on a wide variety of fuels, including compressed hydrogen, methanol, and petroleum.

Concepts and Prototypes

Over the past year, many auto companies commenced plans for entering the emerging "green" car market. This, combined with the substantial commercial commitment to fuel cell technology made by two industry leaders, DaimlerChrysler and Ford, has led to intensified interest in fuel cells to power passenger cars. The fuel cell's compelling combination of performance, range and low to zero-emissions has been demonstrated

in a number of prototype fuel cell powered vehicles over the last 4 years. The first of these, Necar 1, shown by DaimlerChrysler in 1994, used compressed hydrogen as a fuel and the fuel cells took up the entire cargo compartment of a full size van. This compares to the most recent vehicle shown by DaimlerChrysler in March 1999, Necar 4. The Ballard fuel cells and other fuel cell system components are fitted within the confines of a subcompact car without impacting passenger or cargo space. The range of Necar 4 is over 450 kilometers (280 miles) fueled with hydrogen. In addition, in December 1998 DaimlerChrysler unveiled the Jeep Commander, a new concept sports utility vehicle at the Los Angeles auto show, which will eventually be powered by Ballard fuel cells.

Ford completed its first prototype fuel cell vehicle using Ballard fuel cells called the P2000 that was shown in January 1999 at the Detroit auto show. The P2000 runs on hydrogen and has the same performance characteristics and available seating and space as today's Ford Taurus. In addition, Ford also unveiled the P2000 SUV, a concept fuel cell powered sports utility vehicle.

Several other auto companies are also developing and showing prototype vehicles using fuel cells. Toyota demonstrated a fuel cell-battery hybrid RAV4 vehicle fueled with methanol in late 1997. General

Motors exhibited a fuel cell powered minivan at the Paris Motor Show in 1998 and Renault recently unveiled the European Union sponsored fuel cell powered FEVER station wagon. 1999 is expected to bring public showings of several additional fuel cell powered prototype vehicles.

Each one of these vehicles shows the movement of the automotive industry towards the eventual adoption of the fuel cell as the replacement to the internal combustion engine! For Ballard, the growing acceptance of fuel cells among an increasing number of auto companies reinforces Ballard's belief that PEM fuel cells will have widespread commercial success in transportation applications.

Customer Relationships

Along with the ongoing unveiling of vehicle prototypes in 1998, Ballard further developed its customer relationships in the automotive industry. General Motors continued to be a Ballard customer and placed additional orders during the year. Relationships with Nissan and Honda during 1998 led to securing of orders for fuel cells announced early in 1999. With the increasing interest in fuel cells by the world's auto companies and Ballard's leadership position in PEM fuel cells, the Company is expanding its customer base by pursuing opportunities to supply fuel cells to other auto companies.

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"Fuel cells give you the range  
of conventional gasoline  
engines and the emission  
benefits of electrical vehicles."

**Dr. Ferdinand Panik**

*Senior Vice President*

Fuel Cells

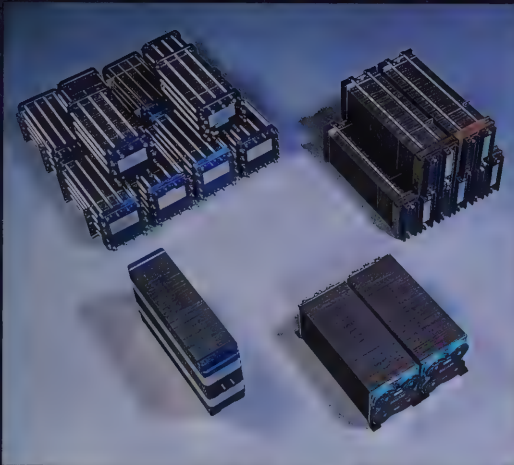
DaimlerChrysler



## Ballard Products

## Market Applications

High efficiency and low maintenance generations of the Necar (New Electric Car) powered by Ballard fuel cells



Power density improvements over four generations. Each group of fuel cells represents approximately 50 kilowatts of power.



Ballard's Necar 3 travels over 400 km (250 miles)

on a single refueling.



Ballard's Necar 4 is a ZEV fuel cell electric car.

## Heavy Duty Transportation

### Transit Buses – Entry Market

Ballard, together with *dbb*, continues to pursue the transit bus market for hydrogen fueled fuel cell engines. Transit buses are an ideal entry point for fuel cell engines. The buses are large enough to accommodate gaseous hydrogen tanks without compromising interior space and are refueled at a central location. Using hydrogen fuel results in zero-emission vehicles, which meet the highest regulatory emission standards.

Today, public transit authorities are proactively looking at alternative clean air technologies to improve air quality within their jurisdictions, in particular, focusing on reducing emissions from diesel engines. For example, transit/highway legislation enacted in the United States in 1998 authorized \$200 million per year for the next five years in grants for the purchase of clean-fuel buses, including those powered by fuel cells. In Europe, the Directive on Heavy Duty Diesel Emissions introduces strict standards for particulate pollution for all new trucks and buses beginning in 2005. Eliminating emissions from transit buses by replacing existing diesel buses with zero-emission fuel cell powered buses is a visible step in improving overall air quality.

### Field Testing – The First Year

Two fuel cell bus field testing and demonstration programs began in 1998, one in Chicago with the Chicago Transit Authority (CTA) and the second in Vancouver with British Columbia Transit (BC Transit). Three hydrogen fueled Ballard® fuel cell powered buses are in field tests for two years in each city. The buses began revenue service in Chicago in March 1998 and in

Vancouver in October 1998. In each city, revenue service followed several months of driver training and testing.

The two field testing and demonstration programs have four main purposes. First, to gather information on the components of the fuel cell system with a goal of testing performance and identifying improvements for incorporation into the next generation. Second, to assess the public's reaction to fuel cell vehicles fueled with hydrogen. Third, to gain information on the performance of the fuel cell engine and systems from bus drivers and mechanics and to incorporate that information into the next generation design. Finally, to gain insight into the requirements of the transit authorities for fuel cell buses.

To date, the bus field trial programs have achieved these goals. During the first year of operation, the three buses in Chicago were taken out of service several times, as planned, both for detailed analysis of components and to incorporate system modifications that were identified during testing. This process will continue with both the CTA and BC Transit buses over the remaining months of the field test programs in order to maximize the technical information Ballard and *dbb* derives from the programs.

CTA and BC Transit are also learning from the results of the test programs. They report that the drivers, maintenance personnel, ridership and general public have a positive reaction to the Ballard fuel cell buses. The drivers and mechanics have been valuable sources of information throughout the programs, identifying aspects of the current prototype fuel cell systems that they see as positive, and, even more importantly, the areas of design and performance that need to be changed and improved. This feedback has led to a number of changes in the current systems and will be included in the next generation

bus engine that is currently under development. The overall response to the CTA and BC Transit prototype buses has been favourable and the current buses have met the American Public Transit Association's required performance standards including acceleration and hill climbing. This performance was achieved with less noise and vibration than conventional diesel engines and with absolutely no emissions.

### Continued Advancement

Ballard and *dbb* also completed the initial prototype of the next generation bus engine that is now undergoing laboratory testing. As well, the development of the commercial prototype engine is underway and initial commercial sales are expected to begin in 2002.

To continue the momentum for the commercial introduction of fuel cell engines for buses, Ballard and *dbb* had established a goal to secure additional orders for its heavy-duty bus engine during 1998. Although this goal was not completed at the end of the year, the companies are well positioned to complete it in 1999 and the planned market entry of commercial heavy-duty bus engines is not affected.

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transporation



"By field testing Ballard fuel cell powered buses on the streets of Chicago, the CTA is proud to pioneer the introduction of fuel cell engines for buses to provide a clean alternative for our riders and our city."

**Craig Lang**

*Senior Vice President*  
Chicago Transit Authority

"BC Transit has been a long supporter of Ballard's early fuel cell powered bus development activities and has a history of incorporating clean alternatives into its fleet. Our field trial fleet of buses powered by Ballard fuel cells allows us to evaluate the zero-emission engines in regular transit service."

**Bob Lingwood**

*President and Chief Executive Officer*  
BC Transit

## Ballard Products

## Market Applications

DaimlerChrysler Nebus powered by Ballard fuel cells



Ballard fuel cell engine using Ballard fuel cells prior to final assembly in a BC Transit bus.



Ballard fuel cell engines delivered to the Chicago Transit Authority for two year test program.



Ballard fuel cell bus engine assembly for field trial buses.



BC Transit unveils the three Ballard fuel cell transit buses operating in the Greater Vancouver area.



Stationary Power Generation

Changing Power Markets

Global markets for the generation and sale of electricity continue to change at a rapid rate, as witnessed by the mergers, acquisitions and asset sales throughout the electricity industry in 1998. North America, Europe, Japan and other parts of the world are continuing the process of opening their electric generation markets to competition. Not only is the industry consolidating, but how power is generated and distributed is also changing.

The restructuring of the electric utility industry is contributing to a move away from large central power generating plants, with high voltage transmission lines, to a new model where power is generated and distributed locally. This restructuring is also presenting utilities and other electricity generators the opportunity to differentiate their products, providing enhanced or "premium" power quality, environmentally benign generation, and the potential for cogeneration (using the waste heat generated by producing electricity). An additional commercial force driving many of these changes is the difficulty of siting large central power plants and high voltage transmission lines due to public concern and resistance to them being located near their homes, places of work or schools.

In addition to electric industry restructuring and power plant siting concerns, environmental compliance requirements and higher air quality standards are also causing fundamental changes in power generation. In the United States, final rules were proposed in September 1998 to implement the ground-level ozone (smog) standards originally proposed in mid-1997. Although states are free to determine how to proceed, compliance plans must be filed by 1999 and the EPA has pointed out that the most cost-effective solution is to cut stationary power plant emissions. Other regulatory changes during 1998 included progress between Canada and the United States on their bilateral smog initiative. Tightening regulations for smog precursor compounds, including nitrous oxides (NOx), are also on the European Union's agenda for 1999.

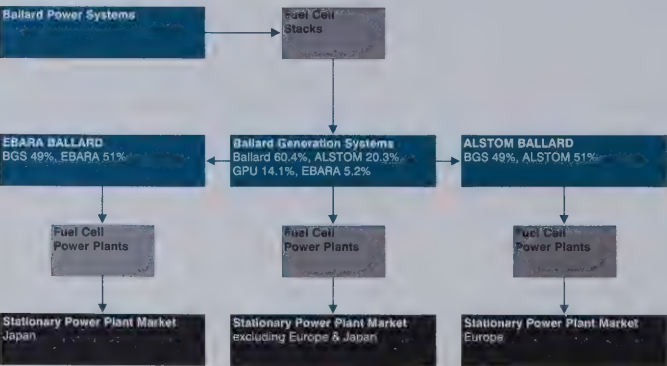
One year after the drafting of the Kyoto global warming protocol, representatives from 177 countries met in Buenos Aires in November 1998. By the end of 1998, the protocol had been signed by 66 nations, including Canada, the United States, and the European Union. It calls for a reduction of greenhouse gases, including CO<sub>2</sub> and NOx. These gases are by-products of burning fossil fuels, a major source of energy for power generation worldwide.

Ballard's Solution

Ballard® fuel cell power plants offer a flexible alternative for utilities, energy companies and other electricity users allowing them to easily add capacity without high voltage transmission lines and excessive emissions. Ballard's 250 kilowatt fuel cell power plant converts natural gas to high quality power with low levels of emissions and high fuel efficiency. The 250 kilowatt power plant is capable of producing enough electricity for a small apartment building or commercial building, or 50 to 60 single-family homes. It is designed to provide efficient, reliable power from a clean, quiet, self-contained unit that can be located on site or nearby.

Distributed power applications, in which a dedicated electricity generator is located at or near the user's site, is the principal target market. The 250 kilowatt power plant may be used to provide "premium" power – uniform, uninterrupted power for computers, health care facilities, manufacturing lines and other critical operations. It may also be used as back-up power and in remote locations. As well, in developing countries with limited power infrastructure, the 250 kilowatt power plant will offer an economical, efficient, environmentally sound, cost effective alternative to the standard electrification model where power is generated centrally, transmitted long distances, and then distributed locally.

Commercialization Strategy – Stationary Power Plants



Ballard Generation Systems – Alliance for Success

Ballard's fuel cell power generation business is organized to take advantage of its own strengths and those of its corporate partners. Ballard Power Systems is responsible for developing and producing the fuel cells. Its subsidiary, Ballard Generation Systems (BGS), develops the systems incorporating the fuel cell and produces and markets the fuel cell power generating plants. BGS is developing fuel cell power plants targeted at market opportunities up to one megawatt in capacity, with the initial product being the 250 kilowatt power plant. BGS is also evaluating potential opportunities for small power generating units in the 1 to 10 kilowatt capacity range.



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start your own business

electric power

"Competition in the electric business is changing the environment energy companies operate in. Our customers are demanding premium quality electricity and flexible power supplies. Innovative technology like Ballard fuel cell power plants will help us meet these customer needs."

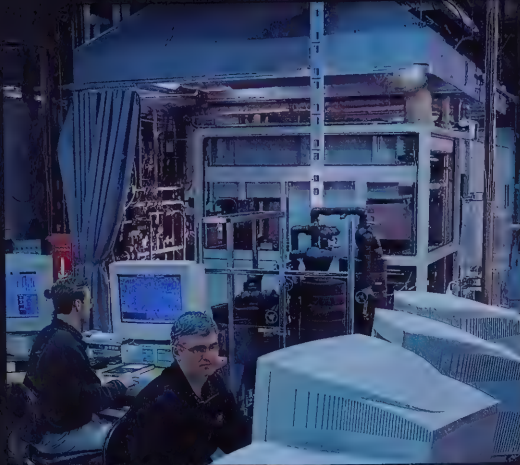
**James E. Rogers**

*Chief Executive Officer*

Cinergy

## Ballard Products

## Market Applications

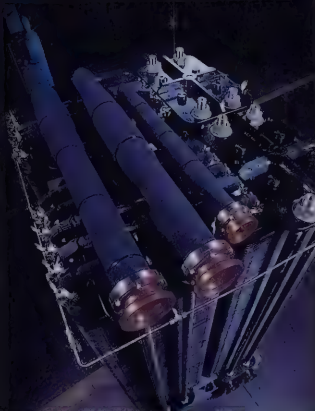


Testing of the 250 kilowatt power plant commissioned in August 1997.

Ballard is a pioneer in the application of Ballard fuel cell power plants.



Ballard fuel cell power plants are used in a variety of applications.



The Ballard 250 kilowatt PEM fuel cell stack is the most powerful in the world.



The 250 kilowatt Ballard fuel cell power plant is used in a variety of applications.



BGS was formed in late 1996, and signed on its first strategic partner, GPU International (GPU), a subsidiary of GPU, in December 1996 to help commercialize its fuel cell power plants. GPU is an international energy company based in New Jersey with a history of leadership in promoting advanced power technologies. GPU reported revenues of over \$4.1 billion in 1997 and services more than 4.3 million customers worldwide.

During 1998 two additional strategic partners joined Ballard and GPU as investors in BGS. ALSTOM SA (formerly GEC ALSTHOM) joined in a transaction valued at \$110 million. This transaction included ALSTOM SA (ALSTOM) receiving a 21.4% equity position in BGS and the formation of ALSTOM BALLARD, which is 51% owned by ALSTOM and 49% owned by BGS. ALSTOM BALLARD will sell, distribute, and ultimately manufacture, Ballard fuel cell stationary power plants in Europe. Based in France, ALSTOM is a world leader in the design and manufacture of equipment and systems for the power generation and transmission industries with annual sales over 14 billion euros.

The second partner, EBARA Corporation (EBARA) of Japan joined BGS in a \$47.7 million transaction. This transaction included EBARA receiving a 5.2% equity position in BGS and the formation of EBARA BALLARD, a company 51% owned by EBARA and 49% owned by BGS which will sell, distribute, and ultimately manufacture, Ballard fuel cell power plants in Japan. Based in Japan, EBARA is globally recognized as a major developer, manufacturer and distributor of fluid machinery and systems, precision machinery

and environmental engineering systems. EBARA is committed to leadership in zero emission technology with reported revenues of over \$4.3 billion in 1998.

The addition of these strong partners provides BGS with a solid global reach, significant market experience, complementary technologies and extensive manufacturing and field service expertise.

Preparing for Field Testing

Field trials of prototypes at an early stage of development is an effective way to ensure that market and customer requirements are incorporated into the development process to rapidly achieve commercialization. It also serves to identify user issues related to siting, service, and specific applications. Field trials for the 250 kilowatt stationary power plant are similar to the bus demonstration and testing programs that Ballard and dbb have underway in Chicago and British Columbia. The programs will allow BGS to test and operate the 250 kilowatt prototype units in actual field conditions. These units will be delivered to customers beginning in 1999 for phased field testing from 1999 through 2001 when commercial introduction is planned.

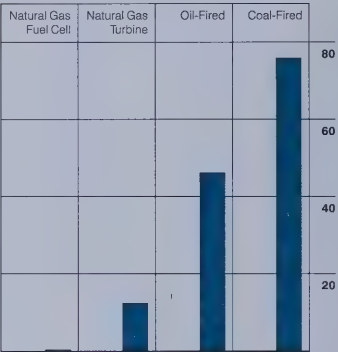
BGS' field trial program will be conducted in two phases so that experience and data gained through the first phase will be incorporated into the second phase field trial design before additional units are built and delivered. This phased program will allow BGS to optimize the commercial 250 kilowatt product design.

Expanding Product Horizons

During 1998, BGS began to review market requirements and opportunities for a 250 kilowatt power plant that uses alternative fuels to natural gas, particularly gas produced by waste water treatment facilities. This activity will continue during 1999.

Also during 1998, BGS began investigating market opportunities for BGS products under 10 kilowatts in

Annual Emissions of a 1 MW Power Plant (tonnes of SOx, NOx and particulates)



capacity. Potential early opportunities include systems for emergency back-up power and primary power located remote from the grid for applications such as telecommunications networks and nodes. During 1999, based upon a review of various market requirements, BGS will begin development on its selected initial product for this market.

building customer relationships

Statistics for as a

electric power

"Distributing Ballard fuel cell power plants in Japan and integrating them into other EBARA products will expand our product capabilities and provide our customers with clean, reliable energy systems while enabling EBARA to meet its commitment to become a true zero emission organization."

**Mr. Hiroyuki Fujimura**

*Chairman*

EBARA Corporation





Beginning construction of the 250 kilowatt field trial units that will commence delivery in 1999



Ballard fuel cell power plant is being tested at a telecommunications tower.



The 250 kilowatt Ballard fuel cell power plant.

Testing and monitoring of the 250 kilowatt prototype power plant and modified subsystems.



A Ballard field trial unit will be tested at a telecommunications tower.

## Portable Applications

In 1998, Ballard began to broaden its focus from transportation and stationary power markets, to include portable fuel cell applications less than ten kilowatts in size. The fuel cell systems developed for these markets operate at low pressures and are expected to be small and rugged enough to be carried anywhere power is needed. The fuel cells for these applications will use the same materials and manufacturing technology as transportation and stationary fuel cells, providing development synergies.

A stated goal for 1998 was to secure strategic partners to access the portable fuel cell markets. After extensive analysis of the business opportunities and the various markets for portable fuel cells, it was determined that a single strategic partner for these markets was not in Ballard's best interest. This conclusion has resulted in a revised strategy for Ballard to sell fuel cells and supporting systems directly to a wide range of original equipment manufacturers that are developing fuel cell powered products for various portable markets. This strategy will allow Ballard better access to diverse portable fuel cell opportunities.

During the year, Ballard made progress towards its goal of developing a commercial portable fuel cell product. A measure of the progress achieved is the delivery of concept portable fuel cell products to Matsushita Electric Works and

Honda R&D, and the development of 100 watt and one kilowatt portable units. The intended use of these portable fuel cells includes emergency power systems, and the development and demonstration of portable power and specialty applications. Ballard also delivered a 100 watt portable demonstration unit to the California Air Resources Board (CARB) in November 1998. CARB will use the unit as an educational tool to teach about alternative technologies and as a demonstration of fuel cell technology.

As part of its development program, Ballard plans to deliver a number of one kilowatt fuel cell market research demonstration systems to original equipment manufacturers and end users for testing and evaluation during 1999. This will allow Ballard to gain a better understanding of customer product requirements and build that information into its product development.

Building on the substantial PEM fuel cell technology base in transportation and stationary power applications, portable products can be rapidly developed and commercialized. The Company currently expects that the first portable product will be in commercial production by 2002.

## Marine and Space Systems

Activities during 1998 also included developing Ballard® fuel cells for marine and space applications. Ballard's initial work on PEM fuel cells began in 1983 with a contract from the Canadian Department of Defence to investigate the use of fuel cells for marine applications. Marine market opportunities, including ship propulsion and on-board

electricity generation, are excellent potential markets for Ballard. Marine engine performance requirements can be met with fuel cell systems developed for other applications adapted for the marine environment.

NASA first used PEM fuel cells in the Gemini space program and has renewed interest in PEM fuel cells following recent advancements. Ballard has delivered fuel cells in the past to NASA for use in a lunar regenerative fuel cell system and, in 1998, Ballard delivered fuel cells for NASA's evaluation for space applications. While marine and space applications are not Ballard's primary focus, they will continue to be part of the Company's development efforts and provide platforms to support further advancements in all commercial fuel cell applications.

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ports electric power



"Working with Ballard fuel cells provides Matsushita Electric Works with the opportunity to expand our business with clean prototype portable power products for leisure use and emergency backup power."

**Dr. Noboru Hashimoto**

*General Manager*

Advanced Technology Research Laboratory  
Matsushita Electric Works



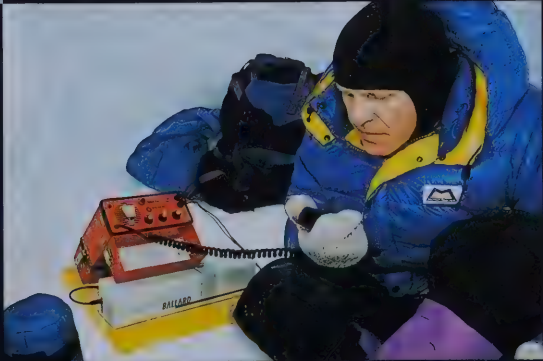
Ballard 100 watt portable fuel cell generator.



Ballard 100 watt portable generator powering a VCR and a television.

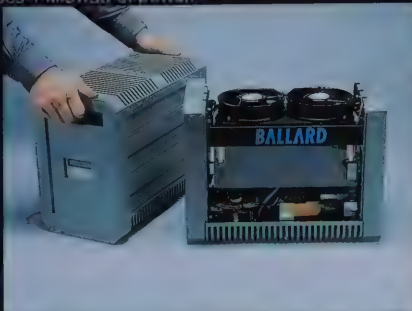


Ballard 100 watt fuel cell stack.



Ballard portable power generator used to power a radio in a snowy environment.

Ballard portable power generator provides 1 kilowatt of power.



## Operating Results, Capital Requirements and Risks

### Overview

In 1989, Ballard began commercializing PEM fuel cell technology. Since then, to support the development and commercialization of its fuel cell products, Ballard has raised capital through the issuance of equity, formed strategic alliances with key companies in targeted markets, developed customer and supplier relationships, and entered into development and demonstration programs with original equipment manufacturers (OEMs), transit authorities and government agencies.

In 1998, Ballard earned revenue from four primary sources: 1) delivery of Ballard® fuel cell demonstration and testing units to OEMs, including hardware sales and engineering support services for their development programs; 2) market development fees paid by strategic partners; 3) contracts with transit authorities and agencies of the governments of British Columbia, Canada and the United States for development and demonstration programs; and 4) development and demonstration programs with customers.

### Review of Operating Results

#### Income Statement Discussion

The following table provides revenue and expense information for the three years ended December 31, 1996 through 1998:

expressed in thousands of Canadian dollars  
year ended December 31

	1998	1997	1996
Revenues	\$ 25,078	\$ 24,192	\$ 25,784
Investment income	20,213	4,064	2,690
Gain on sale of shares of former subsidiary	—	1,440	4,015
Gain on issuance of shares by subsidiary and associated company	45,109	6,536	5,881
Gain on sale of capital assets and intellectual property	8,665	19,431	—
	<b>99,065</b>	55,663	38,370
Cost of revenues	20,354	22,786	23,202
Research and product development	36,331	18,126	15,445
General and administrative	7,588	5,674	3,756
Marketing	3,041	2,552	1,977
Interest	48	55	42
Minority interest	(2,270)	(445)	(132)
Capital taxes	326	283	222
Equity in loss of associated companies	12,441	2,907	—
Amortization of fuel cell technology	3,665	1,227	—
License fee	15,474	—	—
	<b>96,998</b>	53,165	44,512
Earnings (loss) before income taxes	2,067	2,498	(6,142)
Income taxes	1,302	450	—
Net earnings (loss) for year	\$ 765	\$ 2,048	\$ (6,142)

The Company operates in two industry segments, fuel cells and fuel cell systems. Fuel cells comprise the development, manufacture and marketing of PEM fuel cells. Fuel cell systems comprise the development, manufacture and marketing of fuel cell systems that incorporate fuel cells to provide power for applications such as transportation engines, stationary power plants, portable power systems, marine power and aerospace systems. As part of Ballard's alliance with DaimlerChrysler, in August 1997, Ballard transferred its fuel cell system operations for buses, cars, and trucks

to dbb. Therefore, the financial results related to the sale of systems for buses, cars and trucks are reflected in the "Equity in loss of associated companies" line of the income statement. In addition to the dbb results, this line also incorporates the results from other companies in which Ballard has a minority interest including Ecostar, ALSTOM BALLARD, and EBARA BALLARD. A breakdown of the Company's financial results into

the two industrial segments can be found in note 14 of the Company's audited financial statements that form a part of this Annual Report.

The slight decrease in revenues from 1996 to 1997 is due to the completion of long-term contracts for marine applications and the original joint development project with DaimlerChrysler, as well as the timing of revenues for new projects. From 1997 to 1998, revenues increased as a result of supplying fuel cells and related systems to BGS and OEMs for stationary and portable applications, as well as a \$2.9 million fee for stationary power market development received from EBARA.

In 1996, revenues reflected contracts from BC Transit, CTA, DaimlerChrysler, Honda, US Department of Transportation, Volkswagen, Volvo, and others. In 1997, revenues included new contracts with Nissan, DaimlerChrysler, Natural Resources Canada (for the Ford P2000 program), Matsushita Electric Works, and NASA. In 1998, Ballard secured new contracts with companies including Honda, Cinergy, General Motors, EBARA, and ALSTOM.

Investment income increased from 1996 to 1998 reflecting a higher cash and short-term investment position that resulted from funds raised through public equity offerings, the exercise of common share warrants, investments by DaimlerChrysler and Ford in Ballard Power Systems, the further investment in BGS by GPUI, and initial investments in BGS by ALSTOM and EBARA. This was offset by the investments Ballard made in its technology, working capital and infrastructure, and its investments in *dbb*, Ecostar, ALSTOM BALLARD, and EBARA BALLARD.

In 1995, the Company sold its interest in its battery subsidiary in order to focus on its fuel cell operations. This resulted in a total gain on sale of shares of former subsidiary of \$4.0 million in 1996 and

\$1.4 million in 1997. The gain on issuance of shares by subsidiary and associated company relates to the issuance of shares of BGS to GPUI in 1997 and 1998, ALSTOM and EBARA in 1998 and the issuance of shares of *dbb* to Ford in 1998. GPUI and ALSTOM will further invest in BGS in 1999, ultimately reducing Ballard's interest in BGS to 60.4%. At December 31, 1998 Ballard's interest in BGS was 69.3% and in *dbb* was 27%.

The 1997 gain on sale of capital assets and intellectual property of \$19.4 million resulted from Ballard's investment in *dbb* of \$53.3 million in cash and \$30 million in fixed assets and intellectual property (with a nominal carrying value). The 1998 gain on sale of capital assets and intellectual property of \$8.7 million resulted from granting of manufacturing and distribution licenses by BGS to ALSTOM BALLARD and EBARA BALLARD.

The cost of fuel cell revenues decreased from 1996 to 1997 and from 1997 to 1998 as a result of the CTA and BC Transit bus engine demonstration and development programs moving from the construction and assembly phases to the testing phase.

Research and product development expenses consist of development activities funded by the Company, including the cost of obtaining patents. The Company's research and development activities and expenditures have increased from 1996 to 1998. During 1996 and part of 1997, the Company was reliant solely on its own resources to fund its stationary power plant development. In 1997, Ballard began to access a \$30 million contribution from the Technology Partnerships Canada Program of the Canadian government. This program provides about one-third

of the development costs for the 250 kilowatt stationary power plant and is repayable through a royalty on future stationary power plant sales. In 1998, research and product development expenses were double those of 1997 due to the significant increase in research and development activities at Ballard.

General and administrative expenses increased from 1996 to 1998 as a result of growth of the Company and costs related to the securing of strategic relationships. Marketing expenses increased from 1996 to 1998 due to the increased level of marketing related to commercialization activities. The equity in the loss of associated companies resulted from Ballard's 27% ownership in *dbb* and 21% in Ecostar and BGS's 49% ownership in ALSTOM BALLARD and EBARA BALLARD. The increase in equity in loss of associated companies from 1997 to 1998 represents the increase in the number of associated companies, the full year operations of *dbb* in 1998 and the increased level of research and development activities that the associated companies are undertaking. Amortization of fuel cell technology is related to intellectual property acquired from DaimlerChrysler in 1997 that will be amortized over 15 years, the average life of the underlying patents. The \$15.4 million license fee relates to the granting of access to manufacturing technology and know how by ALSTOM as part of their equity investment in BGS.

### Balance Sheet Discussion

Ballard's total cash position (made up of cash and short-term investments) was \$441.3 million at the end of 1998, compared to \$169.8 million in 1997 and \$76.5 million in 1996. The higher cash position resulted primarily from the investments by DaimlerChrysler and Ford in Ballard, further investment in BGS by GPUI, investments in BGS



by ALSTOM and EBARA, and common share warrants exercised in 1998. This increase in cash was offset by the investments Ballard made in its technology, working capital and infrastructure, and its investment in *ddb* and Ecostar. Capital assets increased by 97% to \$45.4 million in 1998 from \$23.1 million in 1997 as a result of purchasing Ballard's corporate headquarters and fuel cell development facility and investments in development, testing and manufacturing infrastructure offset by assets transferred to *ddb* during 1997. As part of the DaimlerChrysler/Ballard strategic alliance in 1997, DaimlerChrysler transferred \$55.0 million in fuel cell technology to Ballard which is a long-term asset for the Company and is being depreciated over the average lifetime of the patents transferred. The formation of *ddb* in 1997, and the formation of Ecostar, ALSTOM BALLARD, and EBARA BALLARD in 1998 have resulted in investments in associated companies of \$132.4 million.

### **Capital Requirements, Resources and Liquidity**

As of December 31, 1998, the Company had cash, short-term investments, and contractual commitments of \$480 million to fund its planned fuel cell development and commercialization activities over the next three to four years. The planned use consists of \$200 million for fuel cell research and product development (including fuel cell cost reduction programs), \$100 million for stationary power plant development programs, \$30 million for new application development programs (including portable and marine), \$100 million to develop manufacturing processes (including establishing pilot scale manufacturing capability), \$30 million for facilities and test equipment and \$20 million for working

capital. Actual funding requirements may vary depending on a variety of factors, including the progress of Ballard's research and development efforts, relationships with strategic partners, results of development and demonstration programs, and advances in competitive technology.

Ballard has incurred net losses every year since 1989, except in 1997 and 1998. In 1997, the Company recorded a small profit due to the sale of assets to *ddb* formed in conjunction with strategic partners. In 1998, Ballard recorded a small profit primarily due to the gains on the issuance of shares by BGS and *ddb* and higher investment income. Ballard expects to incur losses for the next several years as investments are made in product development activities to achieve commercialization of planned products and as a result of having significantly lower gains on issuance of shares by subsidiary and associated company and gain on sale of capital assets and intellectual property as these gains resulted from specific transactions with strategic partners to form fuel cell system development companies. Cash from demonstration programs and development contracts, together with the approximately \$597 million in equity capital raised from a series of public offerings and investments by strategic partners, has provided the Company with adequate financing for the development and demonstration of its products. However, if sufficient internally generated cash or external sources of financing are not available when needed or on terms acceptable to Ballard, or if the Company experiences significant cost overruns on any of its programs for which additional funds cannot be

obtained, certain research and development activities or investment in manufacturing capacity may be delayed or eliminated, resulting in potential delays in the commercialization of the Company's products.

### **Risks**

The development and commercialization plans for Ballard fuel cells and fuel cell systems which are presented in this Annual Report and Management's Discussion and Analysis are forward-looking statements as contemplated by the Safe Harbor provisions of the *US Private Securities Litigation Reform Law of 1995*. Forward-looking statements are subject to risks and uncertainties including those detailed below.

Ballard is a development stage company and its business entails risks and uncertainties that affect its outlook and eventual results of its business and commercialization plan. The primary risks relate to meeting its product development and commercialization milestones, which require that Ballard's products exhibit the cost, durability, and performance required in a commercial product. There is also a risk that market acceptance might take longer to develop than anticipated. Ballard's business plan recognizes and, to the extent possible, attempts to manage these risks by pursuing diverse end markets for its stationary, transportation, portable, and other products. Within these markets, the Company's commercialization plan is focused on products that it believes have a competitive advantage. Further, the plan for product and market development is to work closely with its strategic partners and key customers who together have the capability and understanding of their specific markets to develop products that incorporate Ballard fuel cells to meet consumer requirements.

The demonstration programs in stationary, transportation, and other applications which are required for development and testing of Ballard fuel cells and fuel cell systems in actual field operations entail significant risks. These risks include problems or delays in demonstrations due to technical difficulties, inability to meet design performance goals, including power output, life and reliability, and for transportation applications, the risk of motor vehicle accidents. Ballard mitigates these risks to the extent possible by having detailed project management, formal design reviews, reviews by external experts, contingency plans which anticipate likely problems, safety reviews, training and testing programs related to the operation and maintenance of the fuel cell bus systems, stationary power plants, and portable power plants, and by carrying appropriate liability insurance. However, there can be no assurance that the demonstrations will be successful in meeting their product development, market development and commercialization objectives.

The Company is currently aware of 19 companies located in Europe, the United States, and Japan that are developing PEM fuel cells. Each of these competitors has the potential to capture market share in various markets to Ballard's detriment. Many of these companies are very large in comparison to Ballard and have extensive manufacturing, marketing, and sales capabilities. However, based upon the public information available, none of these companies have developed PEM fuel cells that match the performance of the Ballard fuel cell. Ballard seeks to maintain its technology lead through its strong intellectual property position, which will act as a competitive barrier against PEM fuel cell competitors and by continuing to invest in technology development. However, there can be no assurance that the present or future issued patents will protect

the Company's technology lead. The Company's patents that have been obtained or applied for will expire during the period from 2009 to 2018. The Company also relies upon know-how and trade secrets to maintain its technology lead. However, there is no assurance that this information can be completely protected.

In addition to the competition faced from other PEM fuel cell manufacturers, Ballard fuel cell products must also compete with alternative power products (such as advanced batteries and hybrid engine systems) and existing, established combustion engines, including internal combustion engines and turbines, which are currently in wide use and have established operating and cost features. Ballard's commercialization plan seeks to overcome this competition by focusing on fuel cell products where a competitive advantage exists and by relying on the large overall size of the transportation, stationary, and portable markets to ensure a sufficient market for the Company's products.

The market for Ballard fuel cell transportation products is driven by environmental policies and is therefore subject to the risk of unfavorable government action related to these policies which could have an effect on the Company's outlook and result in delays in the introduction of its products. California is leading the changes with the requirement that 10% of all vehicles sold in 2003 must be ZEVs. Ballard plans to have fuel cells available to meet auto companies' requirements, many of which target 2004 for the introduction of fuel cell vehicles. Any changes in the California regulations may affect the timing of this introduction. The Company's market for transit bus engines is not affected by

the ZEV requirement, as this market is presently not subject to these regulations. Rather, it is driven by the requirements to phase-in lower emission mass transit vehicles under the *US Clean Air Act* of 1990 and the *Energy Policy Act* of 1992. In addition, transit authorities are taking the lead in providing solutions to the air quality problems cities face, although there can be no assurance that transit authorities will purchase Ballard fuel cell engines when available.

One of the Company's markets is for stationary power plants, a market which is being driven by deregulation and restructuring of the electric utility industry globally and the requirements of utilities, independent power producers, and end users. The deregulation of the electric utility industry is subject to government policies that will, over time, determine its pace and extent. Changes in government and public policy over time could impact deregulation and therefore adversely affect the Company's schedule for commercializing stationary power plants. Ballard seeks to manage this risk by focusing on fuel cell products where a clear competitive advantage over conventional power sources exists and by relying on the large overall size of the international stationary markets, many of which are already deregulated, to mitigate the effects of government policy changes in any one jurisdiction.

As described under "Capital Requirements, Resources and Liquidity", Ballard is subject to the risk that if sufficient funds from internal or external sources are not available to the Company to meet the requirements of its development and commercialization programs, certain research and development activities and addition of manufacturing capacity may be delayed or eliminated, resulting in changes to the Company's commercialization plans. Ballard seeks to mitigate this risk by securing funding commitments from a variety of sources, by maintaining a substantial

cash reserve, by being financially conservative in its expenditures and by maintaining good communications with investors and investment bankers to gain access to the public equity markets.

Ballard is also subject to normal operating risks such as credit risks and foreign currency risks. Ballard's credit risks are minimal, as Ballard's customers are large creditworthy corporations and governments. While Ballard's foreign currency sales and purchases are made mainly in US dollars, the Company is not materially exposed to foreign currency exchange fluctuation risks because over time US cash balances are matched, to the extent possible, to planned purchases in US dollars.

#### **Year 2000 Date Conversion**

Ballard's development activities are dependent upon the use of computer systems and, as a result, the Company is vulnerable to the "Year 2000 Issue" where computer systems could fail or create erroneous data as a result of misinterpreting the year designation "00" on January 1, 2000. The Company has completed a review and evaluation of the potential impact that the change in the date to the year 2000 will have on those computer systems. As a result of this review, the Company has determined that all of its major computer systems are able to recognize and appropriately process dates commencing in the year 2000. Ballard's computer systems are based upon commercial

personal computer based software packages. All such software packages have been examined for their compliance and appropriate upgrades are being purchased and installed. Existing personal computer systems that are not year 2000 compliant are scheduled for replacement through mid-1999.

The Company has also completed a review and assessment to identify all other date and time dependent systems and has determined that all of its business critical systems have been verified to be year 2000 compliant. New systems acquired during 1999 will also be reviewed to ensure that they are year 2000 compliant.

Computer systems are also used to operate and monitor fuel cell systems. Ballard has reviewed fuel cell systems that the Company has developed and verified that they are year 2000 compliant. Ballard is unable to verify that prototype fuel cell systems developed by third parties using Ballard fuel cells are year 2000 compliant. However, due to the early stage of commercialization of fuel cell products any potential prototype failures related to the year 2000 are not expected to have a material impact on Ballard's product development or commercialization schedule. During 1998, all key suppliers received a copy of Ballard's year 2000 compliance questionnaire. 94% have replied that they are or will be compliant by mid-1999. Suppliers that have not responded to date are being contacted to follow up. All new suppliers are asked to confirm their year 2000 compliance and all equipment and other suppliers for services that may be date and time sensitive are being contacted to verify that their products and equipment will meet with year 2000 standards. The Company is unable to fully assess

the state of year 2000 readiness of its suppliers and customers. Given Ballard's current development stage and its pilot scale production volumes, it is not anticipated that year 2000 related difficulties in third parties will have a material impact on the Company's business activities or prospects.

To complete the year 2000 compliance process, the Company anticipates incurring total approximate costs of \$70,000 and \$30,000 to upgrade computer and telephone systems, respectively. Costs incurred to date in determining the Company's year 2000 readiness are under \$15,000. The costs to complete the year 2000 compliance process will be incurred as part of the Company's normal capital asset acquisition program and would have been incurred without consideration of year 2000 issues. Because of this and their immateriality with respect to the Company's financial statements, separate numeric disclosure has not been made in the Company's financial statements.



## Financial Statements

Management Report

Auditors' Report

Consolidated Balance Sheets

Consolidated Statements of Income and Accumulated Deficit

Consolidated Statements of Changes in Financial Position

Notes to Consolidated Financial Statements

Corporate Information



## Management Report

The consolidated financial statements contained in this annual report have been prepared by management in accordance with generally accepted accounting principles. The integrity and objectivity of the data in these consolidated financial statements are management's responsibility. Management is also responsible for all other information in the annual report and for ensuring that this information is consistent, where appropriate, with the information and data contained in the consolidated financial statements.

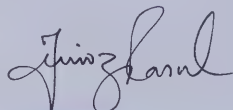
In support of its responsibility, management maintains a system of internal controls to provide reasonable assurance as to the reliability of financial information and the safeguarding of assets. Some of the assets and liabilities include amounts which are based on estimates and judgments as their final determination is dependent on future events.

The Board of Directors is responsible for ensuring that management fulfills its responsibilities for financial

reporting and internal control and exercises this responsibility through the Audit Committee. The Audit Committee consists of three directors who are not involved in the daily operations of the Company. The functions of the committee are to: review the system of internal controls; review any relevant accounting, financial and security regulatory matters; and recommend the appointment of external auditors. The Audit Committee meets on a regular basis with management and the auditors of the Company to satisfy itself that their responsibilities have been properly discharged.

The external auditors, PricewaterhouseCoopers LLP, conduct an independent examination, in accordance with generally accepted auditing standards, and express their opinion on the financial statements. Their examination includes a review and evaluation of the Company's system of internal controls and appropriate tests and procedures to provide reasonable assurance that

the consolidated financial statements are presented fairly and in accordance with generally accepted accounting principles in Canada. The external auditors have full access to management and the Audit Committee with respect to their findings concerning the fairness of financial reporting and the adequacy of internal controls.



**Firoz Rasul**  
*President and  
Chief Executive Officer*  
February 24, 1999



**Michael Graydon**  
*Vice President and  
Chief Financial Officer*  
February 24, 1999

## Auditors' Report

### To the Shareholders of Ballard Power Systems Inc.

We have audited the consolidated balance sheets of Ballard Power Systems Inc. as at December 31, 1998 and 1997 and the consolidated statements of income and accumulated deficit and changes in financial position for each of the years in the three-year period ended December 31, 1998. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In our opinion, these consolidated financial statements present fairly, in all material respects, the financial position of the Company as at December 31, 1998 and 1997 and the results of its operations and the changes in its financial position for each of the years in the three-year period ended December 31, 1998 in accordance with generally accepted accounting principles in Canada.



**Chartered Accountants**  
*Vancouver, Canada*  
February 24, 1999

## Consolidated Balance Sheets

expressed in thousands of Canadian dollars

December 31

notes

		1998	1997
<b>Assets</b>			
<b>Current assets</b>			
Cash and cash equivalents		\$ 348,397	\$ 144,525
Short-term investments		92,906	25,296
Accounts receivable	13	13,722	21,440
Inventories	2	6,616	1,319
Prepaid expenses		836	501
		462,477	193,081
<b>Capital assets</b>	3	45,398	23,127
<b>Fuel cell technology acquired</b>	4	50,091	53,756
<b>Investments in associated companies</b>	4	132,382	70,762
		\$ 690,348	\$ 340,726
<b>Liabilities</b>			
<b>Current liabilities</b>			
Accounts payable and accrued liabilities	5 & 13	\$ 22,200	\$ 14,366
Current portion of capital lease obligation	6	91	91
Deferred revenue		9,052	7,244
Allowance for warranty		13,698	9,228
		45,041	30,929
<b>Capital lease obligation</b>	6	442	542
<b>Minority interest</b>		17,173	504
		62,656	31,975
<b>Shareholders' Equity</b>			
<b>Share capital</b>	7	656,027	337,851
<b>Accumulated deficit</b>		(28,335)	(29,100)
		627,692	308,751
		\$ 690,348	\$ 340,726

Commitments and contingencies

9

Approved by the Board



Director



Director

## Consolidated Statements of Income and Accumulated Deficit

expressed in thousands of Canadian dollars except per share amounts  
year ended December 31

notes	1998	1997	1996
<b>Revenues</b>	<b>\$ 25,078</b>	<b>\$ 24,192</b>	<b>\$ 25,784</b>
<b>Investment income</b>	<b>20,213</b>	<b>4,064</b>	<b>2,690</b>
<b>Gain on sale of shares of former subsidiary</b>	<b>8 —</b>	<b>1,440</b>	<b>4,015</b>
<b>Gain on issuance of shares by subsidiary and associated company</b>	<b>4 45,109</b>	<b>6,536</b>	<b>5,881</b>
<b>Gain on sale of capital assets and intellectual property</b>	<b>4 8,665</b>	<b>19,431</b>	<b>—</b>
	<b>99,065</b>	<b>55,663</b>	<b>38,370</b>
<b>Cost of revenues and expenses</b>			
Cost of revenues	10 20,354	22,786	23,202
Research and product development	10 36,331	18,126	15,445
General and administrative	7,588	5,674	3,756
Marketing	3,041	2,552	1,977
Interest	48	55	42
Minority interest	(2,270)	(445)	(132)
Capital taxes	326	283	222
Equity in loss of associated companies	4 12,441	2,907	—
Amortization of fuel cell technology	4 3,665	1,227	—
License fee	4 15,474	—	—
	<b>96,998</b>	<b>53,165</b>	<b>44,512</b>
<b>Earnings (loss) before income taxes</b>	<b>2,067</b>	<b>2,498</b>	<b>(6,142)</b>
<b>Income taxes</b>	<b>12 1,302</b>	<b>450</b>	<b>—</b>
<b>Net earnings (loss) for year</b>	<b>765</b>	<b>2,048</b>	<b>(6,142)</b>
<b>Accumulated deficit, beginning of year</b>	<b>(29,100)</b>	<b>(31,148)</b>	<b>(25,006)</b>
<b>Accumulated deficit, end of year</b>	<b>\$ (28,335)</b>	<b>\$ (29,100)</b>	<b>\$ (31,148)</b>
<b>Net earnings (loss) per share</b>	<b>15 \$ 0.01</b>	<b>\$ 0.04</b>	<b>\$ (0.14)</b>

## Consolidated Statements of Changes in Financial Position

expressed in thousands of Canadian dollars  
year ended December 31

	1998	1997	1996
<b>Cash provided by (used for) operating activities</b>			
<b>Operations</b>			
Net earnings (loss) for year	\$ 765	\$ 2,048	\$ (6,142)
Items not affecting cash			
Amortization	8,538	4,420	2,063
Minority interest	(2,270)	(445)	(132)
Gain on sale of shares of former subsidiary	—	(1,440)	(4,015)
Gain on issuance of shares by subsidiary and associated company	(45,109)	(6,536)	(5,881)
Gain on sale of capital assets and intellectual property	(8,665)	(19,431)	—
Equity in loss of associated companies	12,441	2,907	—
License fee	15,474	—	—
	(18,826)	(18,477)	(14,107)
<b>Changes in non-cash working capital</b>			
Accounts receivable	7,718	(10,756)	(4,173)
Inventories	(5,297)	1,100	311
Prepaid expenses	(335)	(337)	325
Accounts payable and accrued liabilities	7,834	3,458	3,157
Deferred revenue	1,808	6,513	(743)
Allowance for warranty	4,470	4,554	1,393
	16,198	4,532	270
	(2,628)	(13,945)	(13,837)
<b>Cash provided by (used in) financing activities</b>			
Net proceeds on issuance of share capital	318,176	218,220	60,618
Proceeds on sale of shares of former subsidiary	—	1,440	3,415
Proceeds on issuance of shares by subsidiary and associated company	48,574	6,874	6,563
Proceeds on sale of capital assets and intellectual property	8,665	21,238	—
Repayment of long-term debt	—	(1,099)	(25)
Capital lease obligation	(100)	9	622
	375,315	246,682	71,193
<b>Cash provided by (used in) investing activities</b>			
Net changes in short-term investments	(67,610)	(16,419)	(541)
Additions to capital assets	(27,144)	(10,777)	(10,061)
Investment in fuel cell technology	—	(54,983)	—
Investments in associated companies	(74,061)	(73,669)	—
	(168,815)	(155,848)	(10,602)
<b>Increase in cash and cash equivalents</b>	<b>203,872</b>	<b>76,889</b>	<b>46,754</b>
<b>Cash and cash equivalents, beginning of year</b>	<b>144,525</b>	<b>67,636</b>	<b>20,882</b>
<b>Cash and cash equivalents, end of year</b>	<b>\$ 348,397</b>	<b>\$ 144,525</b>	<b>\$ 67,636</b>



## Notes to Consolidated Financial Statements

amounts expressed in thousands of Canadian dollars except per share amounts

### 1 Significant accounting policies

#### Description of business

The principal business of Ballard Power Systems Inc. (the "Company") is the development and commercialization of proton exchange membrane fuel cells and related power generation systems for stationary, transportation and other applications. The Company's principal customers are major creditworthy industrial concerns and government agencies.

#### Use of estimates

The preparation of consolidated financial statements in conformity with generally accepted accounting principles requires the Company's management to make estimates and assumptions that affect the amounts reported in these financial statements and notes thereto. Actual results could differ from those estimated.

#### Basis of presentation

The consolidated financial statements of the Company have been prepared in accordance with accounting principles generally accepted in Canada. Differences with respect to accounting principles generally accepted in the United States are disclosed in Note 16.

The consolidated financial statements include the accounts of the Company's principal subsidiaries as follows:

percentage ownership	1998	1997	1996
Ballard Advanced Materials Corporation	77.5	77.5	52.5
Ballard Power Corporation	100.0	100.0	100.0
Ballard Power Systems GmbH	100.0	100.0	—
Ballard Generation Systems Inc.	69.3	89.9	94.3

#### Cash and cash equivalents

Cash and cash equivalents consist of cash on deposit and highly liquid short-term interest bearing securities with maturities at the date of purchase of three months or less. Interest earned and any market value gains or losses are recognized immediately in the statement of income.

#### Income taxes

Income taxes are accounted for using the deferral method.

#### Investments

Short-term investments consist of highly liquid short-term interest bearing securities with maturities at the date of purchase greater than three months. Interest earned and any market value gains or losses are recognized immediately in the statement of income.

Investments in shares of companies over which the Company has the ability to exercise significant influence are accounted for by the equity method.

#### Inventories

Inventories are valued at the lower of cost and net realizable value. Costs of materials are determined on an average per unit basis. Work-in-progress and finished goods inventories include materials, labour and production overhead.

#### Fuel cell technology acquired

Fuel cell technology acquired from third parties by the Company is valued at its cost and amortized over its estimated useful life.

#### Amortization

Assets are amortized from the date of acquisition or, in respect of internally constructed assets, from the time an asset is completed and held ready for use. Amortization is computed using the straight-line method over the estimated useful lives of the assets as follows:

Building	30 years
Computer equipment	4 years
Furniture and fixtures	7 years
Leasehold improvements	straight-line basis over the initial term of the respective leases
Pilot production and test equipment	5 to 7 years
Assets under capital lease	as above, based on the category of asset under capital lease
Fuel cell technology acquired	15 years

### Accounting for contracts

Revenue and income from long-term fuel cell related contracts are determined under the percentage-of-completion method where revenues are recognized on a pro-rata basis in relation to contract costs incurred. Unbilled revenues (included in accounts receivable) represent revenues earned in excess of amounts billed on uncompleted contracts. Deferred revenue represents the excess of amounts billed to or cash received from customers over revenue recognized on uncompleted contracts.

### Government assistance and investment tax credits

Government assistance is recorded as either a reduction of the cost of the applicable capital assets or credited in the statement of income as determined by the terms and conditions of the agreements under which the assistance is provided to the Company. Investment tax credits are recorded as either a reduction of the cost of applicable capital assets or credited in the statement of income depending on the nature of the expenditures which gave rise to the credits.

### Research and product development expenditures

Research and product development costs are expensed as they are incurred in accordance with generally accepted accounting principles.

### Patents and license agreements

Costs incurred in establishing and acquiring patents and license agreements are expensed in the period incurred or acquired.

### Allowance for warranty

The Company provides for future warranty costs for contracts in progress quarterly and at the end of each year based on management's best estimates of such costs taking into account past experience and the nature of the contracts.

### Foreign currency translation

Monetary assets and liabilities denominated in currencies other than the Canadian dollar, the Company's functional currency, are translated at the rate of exchange in effect at the end of the year. Revenue and expense items are translated at the rate of exchange in effect on the dates they occur. Exchange gains or losses are reflected in operations immediately.

## 2 Inventories

	1998	1997
Materials	\$ 5,170	\$ 1,144
Work-in-progress	588	175
Finished goods	858	—
	<b>\$ 6,616</b>	<b>\$ 1,319</b>

## 3 Capital assets

December 31, 1998	Cost	Accumulated amortization	Net
Building	\$ 14,057	\$ 344	\$ 13,713
Computer equipment	6,109	2,986	3,123
Furniture and fixtures	3,302	1,336	1,966
Land	5,706	—	5,706
Leasehold improvements	3,657	824	2,833
Pilot production and test equipment	24,520	6,463	18,057
	<b>\$ 57,351</b>	<b>\$ 11,953</b>	<b>\$ 45,398</b>

December 31, 1997	Cost	Accumulated amortization	Net
Computer equipment	\$ 3,846	\$ 1,954	\$ 1,892
Furniture and fixtures	2,994	910	2,084
Leasehold improvements	7,057	868	6,189
Pilot production and test equipment	16,871	3,909	12,962
	<b>\$ 30,768</b>	<b>\$ 7,641</b>	<b>\$ 23,127</b>

Included in computer equipment and furniture and fixtures above are assets under capital lease at a cost of \$1,148 (1997 – \$1,148). Accumulated amortization on these assets is \$601 (1997 – \$479).

#### 4 Investments in associated companies

Investments in associated companies is comprised of the following:

	1998		1997	
	Amount	Percentage ownership	Amount	Percentage ownership
<i>dbb fuel cell engines GmbH</i>	\$ 69,892	27	\$ 70,762	33
Ecostar Electric Drive Systems	53,816	21	—	—
ALSTOM BALLARD	5,615	49	—	—
EBARA BALLARD	3,059	49	—	—
	<b>\$ 132,382</b>		<b>\$ 70,762</b>	

In 1997, the Company entered into an alliance with DaimlerChrysler (formerly Daimler-Benz) that included DaimlerChrysler taking an equity position of 25% in Ballard in exchange for \$146,010 in cash, \$54,983 in intellectual property and \$989 in capital assets. The intellectual property acquired by Ballard is shown in the financial statements as Fuel cell technology acquired (Note 1) and has accumulated amortization at December 31, 1998 of \$4,892 (1997 – \$1,227). The alliance also saw the formation of two companies, *dbb fuel cell engines GmbH* ("*dbb*") and Ballard Automotive Inc. Ballard acquired a one third interest in *dbb* in return for its investment of \$83,000 made up of \$53,000 in cash and \$30,000 in intellectual property and capital assets. The transfer of intellectual property and capital assets resulted in the recognition of a gain on sale of intellectual property and capital assets of \$19,431 in 1997 for Ballard.

During 1998, Ford Motor Company ("Ford") joined the Ballard and DaimlerChrysler alliance in a transaction that included Ford investing cash to take a 15% equity position in Ballard and a 22% interest in *dbb*. DaimlerChrysler's equity position in Ballard was reduced to 20% from 25% and Ballard's interest in *dbb* was reduced to 27% from 33%. This reduction of Ballard's interest in *dbb* is accounted for as an effective disposition of shares and results in a gain for accounting purposes of \$11,545. This gain is included in the gain on issuance of shares by subsidiary and associated company. The Company's interest in *dbb* is accounted for by the equity method. The addition of Ford to the alliance also included the formation of Ecostar Electric Drive Systems ("Ecostar"), a new company that will develop electric vehicle drive systems. In exchange for a cash investment, Ballard acquired a 21% ownership interest in Ecostar which is accounted for by the equity method. Ecostar has in turn acquired a one third interest in Ballard Automotive Inc., reducing Ballard's interest to one third. By agreement, the owners each reimburse Ballard Automotive Inc. proportionately based on their ownership interest for expenses incurred. The share of expenses reimbursed by the Company is shown in the appropriate account in the Company's statement of income.

Ballard Generation Systems ("BGS"), a subsidiary of the Company, is an alliance between the Company, GPU International, ALSTOM and EBARA Corporation. During 1998, BGS issued shares to these third parties, reducing the Company's ownership from 89.9% to 69.3%. This reduction of Ballard's interest is accounted for as an effective disposition of shares and results in a gain for accounting purposes of \$33,564. This gain is included in the gain on issuance of shares by subsidiary and associated company. Part of the consideration received from ALSTOM represented a license valued at \$15,474 to access manufacturing technology and know how which has been included in expenses for the period. As part of the alliance with EBARA, BGS recorded a fee of \$2,898 received from EBARA for stationary market development, which is included in revenues. Also during the period, BGS acquired 49% interests in each of two newly formed companies, ALSTOM BALLARD and EBARA BALLARD in exchange for the granting of manufacturing and distribution rights. The granting of these rights resulted in the recognition of a gain on sale of intellectual property and capital assets of \$8,665 in 1998 for Ballard.

#### 5 Accounts payable and accrued liabilities

	1998	1997
Trade accounts payable	\$ 16,252	\$ 11,259
Other liabilities	2,125	1,285
Wages payable	2,255	1,519
Taxes payable	1,568	303
	<b>\$ 22,200</b>	<b>\$ 14,366</b>

#### 6 Capital lease obligation

	1998	1997
Capital lease obligation	\$ 533	\$ 633
Less: Current portion	91	91
	<b>\$ 442</b>	<b>\$ 542</b>

## 7 Share capital

### Authorized

Unlimited number of Common shares, voting, without par value.

Unlimited number of Preferred shares, issuable in series. The Board of Directors of the Company is entitled to determine the designation, preferences, rights, conditions, restrictions, limitations and prohibitions to be attached to each series of such shares.

	1998		1997		1996	
	Number of shares	Amount	Number of shares	Amount	Number of shares	Amount
<b>Issued</b>						
<b>Common shares</b>						
Balance, beginning of year	69,758,859	\$ 337,851	46,060,716	\$ 117,812	36,869,103	\$ 57,267
Issued during year for cash (net of issue costs)	11,240,700	301,719	12,531,813	140,274	8,248,860	58,201
Issued during year for intellectual property and capital assets (Note 4)	—	—	4,797,600	55,972	—	—
Options exercised during year	1,602,829	11,957	1,319,262	5,893	700,464	1,870
Warrants exercised during year	600,000	4,500	4,844,583	17,900	142,389	474
Share distribution plan	129,495	—	204,885	—	99,900	—
Balance, end of year	83,331,883	656,027	69,758,859	337,851	46,060,716	117,812
<b>Series 1 Preferred shares</b>						
Balance, beginning of year	1	—	—	—	—	—
Issued during year for cash (net of issue costs)	—	—	1	—	—	—
Retracted during year	(1)	—	—	—	—	—
Balance, end of year	—	—	1	—	—	—
<b>Series 2 Preferred shares</b>						
Balance, beginning of year	—	—	—	—	—	—
Issued during year for cash (net of issue costs)	1	—	—	—	—	—
Balance, end of year	1	—	—	—	—	—
<b>Series 3 Preferred shares</b>						
Balance, beginning of year	—	—	—	—	—	—
Issued during year for cash (net of issue costs)	1	—	—	—	—	—
Balance, end of year	1	—	—	—	—	—
<b>Warrants</b>						
Balance, beginning of year	840,000	—	5,144,961	1,819	4,987,350	1,746
Issued during year for cash (net of issue costs)	1,050,000	—	540,000	—	300,000	131
Exercised during year	(600,000)	—	(4,844,583)	(1,818)	(142,389)	(58)
Expired during year	—	—	(378)	(1)	—	—
Balance, end of year	1,290,000	—	840,000	—	5,144,961	1,819
Total shares and warrants, end of year	84,621,885	\$ 656,027	70,598,860	\$ 337,851	51,205,677	\$ 119,631

### Stock split

In 1998, shareholders approved a 3-for-1 stock split of Ballard's Common shares for shareholders of record on June 5, 1998. The number of shares disclosed in the financial statements have been restated to reflect the result of the stock split.



### Share incentive plans

In 1997, the Company adopted new share incentive plans replacing the previous plans. The following is a description of the material provisions of the 1997 plans.

#### ■ Share option plan

All directors, officers, employees, and consultants of the Company and its subsidiaries are eligible to participate in the share option plan. The number of Common shares which may be made subject to option under the share option plan is limited to 4,050,000. As at December 31, 1998, 1,685,500 options have been issued under this plan.

All options will be for a term of 10 years from the date of grant unless otherwise determined by the Board of Directors. One third of the options vest and may be exercised in each of the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> years after granting.

Share options (1997 and previous plans)	Common shares	Price
Balance, December 31, 1996	4,634,733	\$ 2.36 to \$ 7.42
Options granted	985,800	\$ 11.82 to \$ 24.75
Options exercised	(1,319,262)	\$ 2.36 to \$ 11.82
Options cancelled	(152,880)	\$ 2.40 to \$ 11.82
Balance, December 31, 1997	4,148,391	\$ 2.36 to \$ 24.75
Options granted	1,685,500	\$ 35.00 to \$ 49.40
Options exercised	(1,602,829)	\$ 2.36 to \$ 35.00
Options cancelled	(35,758)	\$ 4.58 to \$ 35.00
Balance, December 31, 1998	4,195,304	\$ 2.36 to \$ 49.40

#### ■ Share distribution plan

The share distribution plan permits up to 450,000 Common shares to be issued without cash consideration to employees of the Company to recognize their past contributions and to encourage future contributions to the Company, and in some instances in lieu of cash compensation. At December 31, 1998, there are 315,720 (1997 – 445,215) shares remaining for distribution. During 1996 and 1997, 300,000 shares were issued under the previous share distribution plan.

### Series 1 Preferred shares

In 1997, as part of the DaimlerChrysler/Ballard Power Systems alliance agreement, the Company issued one Series 1 Preferred share. This share is convertible, redeemable and non-voting except for the right to elect a number of directors based on the Common shareholdings of the Company by DaimlerChrysler. This share was retracted during the year as part of the investment transaction resulting from the addition of Ford Motor Company to the Ballard alliance group.

### Series 2 Preferred shares

In 1998, as part of the DaimlerChrysler/Ford/Ballard Power Systems alliance agreement, the Company issued one Series 2 Preferred share. This share is convertible, redeemable and non-voting except for the right to elect a number of directors based on the Common shareholdings of the Company by DaimlerChrysler.

### Series 3 Preferred shares

In 1998, as part of the DaimlerChrysler/Ford/Ballard Power Systems alliance agreement, the Company issued one Series 3 Preferred share. This share is convertible, redeemable and non-voting except for the right to elect a number of directors based on the Common shareholdings of the Company by Ford Motor Company.

### Warrants

The Company issued 4,987,500 Warrants as part of its public offerings in 1993 and 1994. Each Warrant entitled the holder to purchase one Common share of the Company upon payment of the exercise price of \$3.33 on or before June 16, 1997. By June 16, 1997, 4,987,122 Warrants were exercised with the balance of 378 Warrants cancelled on expiry.

The Company issued 1,890,000 Warrants to joint development partners in 1996, 1997 and 1998. During the year, 600,000 Warrants were exercised. Each Warrant entitles the holder to purchase one Common share of the Company upon completion of certain purchase commitments from the Company and upon payment of exercise prices of \$8.54 to \$26.03 between March 19, 2001 and October 29, 2002.

## 8 Disposition of subsidiary

Effective April 28, 1995, the Company sold its entire interest in Ballard Battery Systems Corporation to Bashaw Holdings Ltd. which was subsequently renamed BlueStar Battery Systems International Corp. ("BlueStar International"). For its interest in Ballard Battery Systems Corporation, the Company received a convertible debenture of BlueStar International of a principal amount of approximately \$1,500. The debenture matured September 30, 1997 and bore interest at the

rate of 6% per annum payable in cash or in shares at the option of BlueStar International, subject to regulatory approval. The debentures were convertible into common shares of BlueStar International at the rate of one common share per dollar of principal.

During 1997, the Company converted the remaining \$720 (1996 – \$846) of principal into common shares which it subsequently sold, resulting in a gain of \$1,440 (1996 – \$4,015).

## 9 Commitments and contingencies

At December 31, 1998, the Company is committed to payments under operating leases for premises as follows:

1999	\$ 888
2000	1,697
2001	1,542
2002	1,388
2003	1,388
Thereafter	28,513
Total minimum lease payments	\$ 35,416

The Company has agreed to pay royalties in respect of sales of stationary power plants under two development programs with government agencies. The total combined royalty is limited in any year to 4% of revenue from stationary power plant sales. Under the Utilities Development Program (Phase 1) with the Governments of Canada and British Columbia, the royalty is at a rate of 4% commencing in 1998 to the aggregate of the original amount of the government contribution. Under the terms of the Utilities Development Program (Phase 2) with Technology Partnerships Canada entered into during 1997, the Company has agreed to pay a 4% royalty on future revenue from stationary power plants to a maximum of \$38,330 in exchange for a contribution of 32% of costs incurred in the development and demonstration of a 250 kilowatt natural gas PEM stationary power plant up to a maximum contribution of \$29,360. The Technology Partnerships Canada royalty becomes payable at the later of January 1, 2001 and January 1 of the year the Company reports a net profit after tax on its audited financial statements. During 1998, the Company claimed \$7,110 (1997 – \$7,826; 1996 – \$Nil) of which \$5,459 (1997 – \$6,718; 1996 – \$Nil) has been credited against research and product development, \$358 (1997 – \$Nil; 1996 – \$Nil) has been credited to cost of revenues and \$1,293 (1997 – \$1,108; 1996 – \$Nil) has been credited against capital assets.

At December 31, 1998, the Company was committed to expenditures in respect of long-term fuel cell related development contracts amounting to \$Nil (1997 – \$Nil; 1996 – \$52). These commitments were related to contracts with certain third parties under which the Company received \$Nil (1997 – \$Nil; 1996 – \$1,072).

Under the terms of the Company's agreement with DaimlerChrysler (*Note 4*), it is committed to spend \$90,000 on the development of fuel cells and related manufacturing processes for bus, car and truck applications.

The Company has issued a letter of credit in the amount of \$1,387 related to a lease agreement for premises.

The Year 2000 Issue arises because many computerized systems use two digits rather than four digits to identify a year. Date-sensitive systems may recognize the year 2000 as 1900 or some other date, resulting in errors when information using the year 2000 date is processed. In addition, similar problems may arise in some systems that use certain dates in 1999 to represent something other than a date. The effects of the Year 2000 Issue may be experienced before, on, or after January 1, 2000, and if not addressed, the impact on operations and financial reporting may range from minor errors to significant system failures which could affect an entity's ability to conduct normal business operations. It is not possible to be certain that all aspects of the Year 2000 Issue affecting the entity, including those related to the efforts of customers, suppliers, or other third parties will be fully resolved.

## 10 Research and product development

The Company develops products and related technology using its own resources and through product development and demonstration contracts with strategic partners and various government agencies. The Company is entitled to use the products and technology developed under these contracts. The total expenditures related to this research and product development in the year are included in:

	1998	1997	1996
Research and product development, net of government contributions	\$ 36,331	\$ 18,126	\$ 15,445
Cost of revenues, net of government contributions	15,508	20,278	19,878
Government contributions	5,817	6,718	178
	\$ 57,656	\$ 45,122	\$ 35,501

**11 Patents and intellectual property**

The Company obtains protection of the intellectual property which it develops by appropriate filing for patents in Canada, the United States and other countries. Legal expenditures related to such filings in the year are included in:

	1998	1997	1996
Research and product development	\$ 960	\$ 594	\$ 748

**12 Income taxes**

The Company's computation of income tax expense is as follows:

	1998	1997	1996
<b>Earnings (loss) before income taxes</b>	<b>\$ 2,067</b>	\$ 2,498	\$ (6,142)
<b>Add (deduct)</b>			
Taxable gain on sale of technology not recognized for accounting purposes	8,325	9,715	—
Gain on issuance or disposition of subsidiary shares not subject to tax	(45,109)	(6,536)	(7,287)
Net tax losses not recognized	23,436	10,375	14,635
Utilization of prior years' losses not previously recognized	(341)	(7,530)	—
Gain on sale of technology not subject to tax	(4,247)	(7,621)	—
License fee not deductible for tax	3,868	—	—
Foreign exchange losses not subject to tax	5,159	—	—
Minority interest	(2,270)	(445)	(132)
Equity in loss of associated companies	12,441	2,907	—
Other items	(3,329)	(3,363)	(1,074)
<b>Accounting income for tax purposes</b>	<b>\$ —</b>	\$ —	\$ —
<b>Large Corporation Tax expense</b>	<b>\$ 1,302</b>	\$ 450	\$ —

The Company has available for carryforward the following:

as at December 31	1998	1997
Scientific research expenditures	\$ 61,075	\$ 40,551
Canadian losses from operations	\$ 1,062	\$ 133
German losses from operations	\$ 2,459	\$ 1,726
U.S. losses from operations	\$ 2,775	\$ 1,525
Investment tax credits	\$ 27,448	\$ 20,707

These balances do not include \$15,348 (1997 - \$2,907) of losses which are available to associated companies. The scientific research expenditures may be carried forward indefinitely. The Canadian losses of \$1,062 can be used to offset future Canadian taxable income and expire in the year 2006. The German non-capital losses of \$2,459 can be used to offset future taxable income in Germany and may be carried forward indefinitely. The U.S. losses of \$2,775 can be used to offset future U.S. taxable income and expire over the period from 2007 to 2013. Investment tax credits can be used to offset future taxes otherwise payable and expire as follows:

year of expiry	Investment tax credits
1999	\$ 319
2000	352
2001	244
2002	99
2003	1,460
2004	1,542
2005	4,611
2006	6,558
2007	5,441
2008	6,822
	<b>\$ 27,448</b>



### 13 Related party transactions

The Company provides administrative and other services to associated companies (Note 4). The Company also subcontracts certain engineering services to these related companies. Revenues include sales of fuel cells and related equipment of \$2,397 (1997 – \$1,177) to these related companies. Cost of revenues and expenses include purchases of \$6,232 (1997 – \$2,060) from these companies offset by administrative services billed to these related companies of \$892 (1997 – \$619). The Company was billed by an entity with an ownership interest in the Company for contract research and product development costs totalling \$2,619 (1997 – \$502). At December 31, 1998, the Company has an accounts receivable balance of \$2,016 (1997 – \$2,975) due from these companies and has an accounts payable balance of \$3,713 (1997 – \$2,100) due to these companies.

Ballard Generation Systems ("BGS"), a subsidiary of the Company, has commitments to issue additional common shares to investors of BGS in 1999 and 2000. The issuance of shares is dependent on completion of certain performance milestones and would reduce the Company's ownership in BGS from 69.3% to 61.4%.

### 14 Segmented financial information

The Company has adopted the new accounting standard relating to segment disclosures. The prior year's segment information has been restated to present the Company's reportable segments. The adoption of this standard did not affect the results of operations or financial position. The accounting policies for the segments are the same as those described in Note 1.

The Company's two reportable segments represent strategic business units that offer different products to different markets and require the use of different technologies in their manufacture and development.

During 1998, the Company operated in two industry segments, fuel cells and fuel cell systems. Fuel cell operations comprise the development, manufacture and marketing of proton exchange membrane fuel cells. Fuel cell systems comprise the development, manufacture and marketing of fuel cell systems that incorporate a fuel cell to provide power for applications such as transportation engines, stationary power plants, marine power systems, and portable power systems.

December 31, 1998	Fuel Cells	Fuel Cell Systems	Total
Revenues	\$ 14,063	\$ 11,015	\$ 25,078
Loss for year	\$ (35,951)	\$ (6,285)	\$ (42,236)
Identifiable assets	\$ 497,851	\$ 192,497	\$ 690,348
Investments in associated companies	\$ —	\$ 132,382	\$ 132,382
Amortization	\$ 7,310	\$ 1,228	\$ 8,538
Capital expenditures	\$ 23,395	\$ 3,749	\$ 27,144

#### Reconciliation of net earnings (loss) for year

Segment loss for year	\$ (42,236)
Investment income	20,213
Gain on issuance of shares by subsidiary and associated company	45,109
Gain on sale of capital assets and intellectual property	8,665
Equity in loss of associated companies	(12,441)
Amortization of fuel cell technology	(3,665)
License fee	(15,474)
Other	1,896
Earnings before income taxes	\$ 2,067

Revenues from two commercial customers of \$3,967 and \$3,487 are included in the fuel cells segment. Revenues from one commercial customer of \$2,898 and a government agency of \$3,558 are included in the fuel cell systems segment.



**14 Segmented financial information** continued**December 31, 1997**

	Fuel Cells	Fuel Cell Systems	Total
Revenues	\$ 13,041	\$ 11,151	\$ 24,192
Loss for year	\$ (12,689)	\$ (12,257)	\$ (24,946)
Identifiable assets	\$ 236,168	\$ 104,558	\$ 340,726
Investments in associated companies	\$ —	\$ 70,762	\$ 70,762
Amortization	\$ 3,606	\$ 814	\$ 4,420
Capital expenditures	\$ 6,743	\$ 4,034	\$ 10,777

**Reconciliation of net earnings (loss) for year**

Segment loss for year	\$ (24,946)
Investment income	4,064
Gain on sale of shares of former subsidiary	1,440
Gain on issuance of shares by subsidiary	6,536
Gain on sale of capital assets and intellectual property	19,431
Equity in loss of associated companies	(2,907)
Amortization of fuel cell technology	(1,227)
Other	107
Earnings before income taxes	\$ 2,498

Revenues from two transit authorities of \$6,810, a government agency of \$5,094 and one commercial customer of \$3,058 are included in the fuel cells and fuel cell systems segments.

**December 31, 1996**

	Fuel Cells	Fuel Cell Systems	Total
Revenues	\$ 15,137	\$ 10,647	\$ 25,784
Loss for year	\$ (7,893)	\$ (10,703)	\$ (18,596)
Identifiable assets	\$ 86,889	\$ 20,241	\$ 107,130
Amortization	\$ 1,270	\$ 793	\$ 2,063
Capital expenditures	\$ 5,954	\$ 4,107	\$ 10,061

**Reconciliation of net earnings (loss) for year**

Segment loss for year	\$ (18,596)
Investment income	2,690
Gain on sale of shares of former subsidiary	4,015
Gain on issuance of shares by subsidiary	5,881
Other	(132)
Loss before income taxes	\$ (6,142)

Revenues from two transit authorities of \$7,910 and one commercial customer of \$7,369 are included in the fuel cells and fuel cell systems segments.

Revenues and capital asset information by geographic area as at and for the years ended December 31 is as follows:

	1998		1997		1996	
	Revenue	Capital assets	Revenues	Capital assets	Revenues	Capital assets
Canada	\$ 5,111	\$ 42,046	\$ 6,452	\$ 20,712	\$ 5,578	\$ 17,146
United States	10,792	42	13,029	23	8,089	204
Japan	7,361	—	2,419	—	2,076	—
Germany	713	3,310	2,180	2,392	10,041	—
Other foreign countries	1,101	—	112	—	—	—
	\$ 25,078	\$ 45,398	\$ 24,192	\$ 23,127	\$ 25,784	\$ 17,350

Revenues are attributed to countries based on location of customer.

### 15 Net earnings (loss) per share

Net earnings (loss) per share is calculated using the weighted average number of Common shares outstanding for the year which amounted to 79,416,317 (1997 – 55,505,322; 1996 – 42,906,333). Fully diluted earnings per share, which has been calculated on the basis that all share options and warrants were exercised at the later of the date of vesting or the beginning of the year, is not dilutive.

### 16 Differences between Canadian and United States accounting principles and practices

The consolidated financial statements have been prepared in accordance with accounting principles and practices generally accepted in Canada ("Canadian basis") which differ in certain respects from those principles and practices that the Company would have followed had its consolidated financial statements been prepared in accordance with accounting principles and practices generally accepted in the United States ("U.S. basis").

■ On a Canadian basis, the Company's carrying value of its investment in *dbb fuel cell engines GmbH* ("dbb") includes the value of intellectual property transferred to dbb. On a U.S. basis, this intellectual property is not recorded by dbb. Accordingly, on a U.S. basis, the gain on issuance of shares by dbb is increased and the Company's equity in the loss of dbb is decreased.

■ On a Canadian basis, the Company is required to recognize the gain on sale of capital assets and intellectual property in exchange for an equity interest in an associated company. However, on a U.S. basis, the Company is required to not recognize any gains resulting from these transactions.

■ On a Canadian basis, the Company has accounted for funding received under the Technology Partnerships Canada ("TPC") agreement in accordance with specific pronouncements on accounting for government assistance by reducing research and product development expenses, cost of revenues and capital assets by the amount of the funding received. On a U.S. basis, there are no authoritative accounting standards addressing the various types of government assistance programs. Since the TPC funding combines the characteristics of a grant with some characteristics of a debt instrument, the Company has adopted a conservative approach which requires the recording of the entire funding as long-term debt.

■ On a Canadian basis, the Company is required to account for gains and losses on the issuance of shares by a subsidiary or other entity which the Company accounts for on an equity basis, as a component of income. On a U.S. basis, the effect of such dilution gains varies with the circumstances of the transaction. In 1996 and 1997, based on the advice of the Company's auditors, gains in 1996 and 1997 were recognized as income on a Canadian basis and on a U.S. basis. In connection with the finalization of the audit for the 1998 financial year, the Company's auditors reconsidered their advice in respect of the treatment of previously recorded dilution gains and advised the Company that on a U.S. basis, the gains in 1996, 1997 and 1998 should be recorded in equity, as an increase in paid-in capital rather than as income. 1998 gains have been stated and 1996 and 1997 gains have been restated in the table of Canadian and U.S. accounting differences in accordance with the advice.

■ On a U.S. basis, shares issued under the Company's share distribution plan are deemed to be compensatory.

■ On a U.S. basis, non-cash transactions would be excluded from the statements of changes in financial position.

*goes to equity in U.S.*

*Note to N.A.'s -  
This goes to Sandy  
Joh*

These differences would have been reported in the consolidated balance sheets, consolidated statements of income and accumulated deficit and consolidated statements of changes in financial position as follows:

	1998		1997		1996	
	Canadian basis	U.S. basis	Canadian basis	U.S. basis	Canadian basis	U.S. basis
<b>Consolidated balance sheets</b>						
Capital assets	\$ 45,398	\$ 47,799	\$ 23,127	\$ 24,235	\$ —	\$ —
Investments in associated companies	\$ 132,382	\$ 109,759	\$ 70,762	\$ 51,331	\$ —	\$ —
Long-term debt	\$ 442	\$ 15,378	\$ 542	\$ 8,368	\$ —	\$ —
Shareholders' equity	\$ 627,692	\$ 592,534	\$ 308,751	\$ 282,602	\$ 88,483	\$ 88,483

	1998	1997	1996
<b>Consolidated statements of income and accumulated deficit</b>			
Net earnings (loss) under Canadian GAAP	\$ 765	\$ 2,048	\$ (6,142)
Gain on issuance of shares by subsidiary and associated company	(45,109)	(6,536)	(5,881)
Gain on sale of capital assets and intellectual property	(8,665)	(19,431)	—
Cost of revenues	(358)	—	—
Research and product development	(5,459)	(6,718)	—
Equity in loss of associated companies	1,787	—	—
Compensatory shares and options issued	(5,455)	(3,527)	(692)
Net loss under U.S. GAAP	\$ (62,494)	\$ (34,164)	\$ (12,715)
Basic/diluted loss per share, U.S. GAAP	\$ (0.79)	\$ (0.62)	\$ (0.30)

*108  
112  
112  
108  
65  
goes to equity in U.S.  
(see prior page)*

	1998	1997	1996
<b>Consolidated statements of changes in financial position</b>			
Cash provided by (used for) operating activities under Canadian GAAP	\$ (2,628)	\$ (13,945)	\$ (13,837)
Cost of revenues	(358)	—	—
Research and product development	(5,459)	(6,718)	—
Cash provided by (used for) operating activities under U.S. GAAP	\$ (8,445)	\$ (20,663)	\$ (13,837)
Cash provided by (used in) financing activities under Canadian GAAP	\$ 375,315	\$ 246,682	\$ 71,193
Issuance of long-term debt	7,110	7,826	—
Common shares issued for intellectual property and capital assets	—	(55,972)	—
Proceeds on issuance of shares by subsidiary and associated company	(11,545)	—	—
Proceeds on sale of intellectual property and capital assets	(8,665)	(21,238)	—
Cash provided by financing activities under U.S. GAAP	\$ 362,215	\$ 177,298	\$ 71,193
Cash provided by (used in) investing activities under Canadian GAAP	\$ (168,815)	\$ (155,848)	\$ (10,602)
Additions to capital assets	(1,293)	699	—
Investment in fuel cell technology	—	55,972	—
Investments in associated companies	20,210	19,431	—
Cash provided by (used in) investing activities under U.S. GAAP	\$ (149,898)	\$ (79,746)	\$ (10,602)

#### 17 Fair value of financial instruments

At December 31, 1998 and 1997, the fair value of cash and cash equivalents, short-term investments, accounts receivable, accounts payable and accrued liabilities approximates carrying values because of the short-term nature of these instruments. Capital lease obligations are at market terms and accordingly, the carrying value is equal to the fair value.

#### 18 Comparative amounts

Certain prior year amounts have been reclassified to conform with the presentation adopted in the current year.

*45,109 dilution gains - go to equity, per US GAAP*

# supplemental

## mailing list form

If you wish to be on Ballard's Supplemental Mailing List for Annual and Quarterly Reports, please complete and return this card by mail or by facsimile to 604.412.4700.

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Company \_\_\_\_\_

Title \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State / Province \_\_\_\_\_ Zip / Postal Code \_\_\_\_\_

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**Ballard Power Systems Inc.**

9000 Glenlyon Parkway  
Burnaby, British Columbia  
Canada V5J 5J9

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## Corporate Information

### Directors

**Dr. J. Fraser Mustard**

*Chairman of the Board  
Founding President  
Canadian Institute  
for Advanced Research  
Founder's Network  
Toronto ON Canada*

**Stephen T. Bellringer<sup>1,3</sup>**

*President and Chief Executive Officer  
Orca Bay Sports & Entertainment  
Former President and  
Chief Executive Officer  
BC Gas Inc.  
Vancouver BC Canada*

**Dr. Edgar Krökel<sup>1</sup>**

*Senior Vice President – Mergers  
& Acquisitions  
DaimlerChrysler AG  
Stuttgart Germany*

**James R. Leva<sup>2</sup>**

*Retired Chairman, President  
and Chief Executive Officer  
GPU, Inc.  
Marco Island FL USA*

**Dr. Neil W. Ressler<sup>2</sup>**

*Vice President and Chief  
Technical Officer – Research  
and Vehicle Technology  
Ford Motor Company  
Dearborn MI USA*

**Dr. Ferdinand Panik<sup>3</sup>**

*Senior Vice President – Fuel Cells  
DaimlerChrysler AG  
Stuttgart Germany  
President and Chief Executive Officer  
dbb fuel cell engines GmbH*

**Firoz Rasul**

*President and Chief Executive Officer  
Ballard Power Systems Inc.  
Vancouver BC Canada*

**Raymond Royer<sup>2,3</sup>**

*President and Chief Executive Officer  
Domtar Inc.  
Montreal QC Canada*

**Douglas W. G. Whitehead<sup>1,3</sup>**

*President and Chief Operating Officer  
Finning International Inc.  
Vancouver BC Canada*

<sup>1</sup> Member of the Audit Committee — Chairman  
Douglas W. G. Whitehead

<sup>2</sup> Member of the Management Development &  
Compensation Committee — Chairman  
Raymond Royer

<sup>3</sup> Member of the Corporate Governance and  
Nominating Committee — Chairman  
Stephen T. Bellringer

### Officers of the Company

**Firoz Rasul**

*President and Chief Executive Officer  
Ballard Power Systems Inc.*

**Layle K. (Kip) Smith**

*Chief Operating Officer  
Ballard Power Systems Inc.*

**Michael Graydon**

*Vice President and Chief Financial Officer  
Ballard Power Systems Inc.*

**Paul Lancaster**

*Vice President, Corporate Development  
Ballard Power Systems Inc.*

**Noordin S. K. Nanji**

*Vice President, Corporate Secretary  
and General Counsel  
Ballard Power Systems Inc.*

**Neil Otto**

*Vice President  
Ballard Power Systems Inc.  
President, Ballard Automotive Inc.*

**Dr. Alfred E. Steck**

*Vice President, Research  
and Development  
Ballard Power Systems Inc.  
President, Ballard Advanced  
Materials Corporation*

**Scott A. Weiner**

*Vice President  
Ballard Power Systems Inc.  
President, Ballard  
Generation Systems Inc.*

### Corporate Offices

Corporate Headquarters  
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Germany

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Poway CA USA 92064-7102

Unit C, 4242 Phillips Avenue  
Burnaby BC Canada V5A 2X2

116 Village Boulevard, Suite 200  
Princeton NJ USA 08540-5799

### Transfer Agent and Registrar

Montreal Trust Company  
Stock and Bond Transfer Department  
510 Burrard Street  
Vancouver, BC Canada V6C 3B9  
604.661.0222 Telephone  
604.661.9480 Facsimile

### Bankers

Royal Bank of Canada  
Vancouver BC Canada

### Independent Auditors

PricewaterhouseCoopers LLP  
Vancouver BC Canada

### Legal Counsel

Corporate & Securities  
Lang Michener Lawrence & Shaw  
Vancouver BC Canada

Intellectual Property  
McAndrews, Held & Malloy, Ltd.  
Chicago IL USA

### Stock Listing

The Company's Common shares are listed on The Toronto Stock Exchange under the trading symbol BLD and on the Nasdaq National Market System under the trading symbol BLDP.

### Investor Relations

To obtain additional information about the Company or to be placed on the Company's supplemental list for quarterly reports please contact:

**Ballard Power Systems Inc.**

Investor Relations  
9000 Glenlyon Parkway  
Burnaby BC Canada V5J 5J9  
604.412.3195 Telephone  
604.412.3100 Facsimile

investors@ballard.com  
<http://www.ballard.com>

### Annual Meeting

The Annual Meeting of Shareholders of Ballard Power Systems Inc. will be held at the Vancouver Trade & Convention Centre 999 Canada Place Vancouver BC Canada on May 20 1999, at 1:00 p.m.

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